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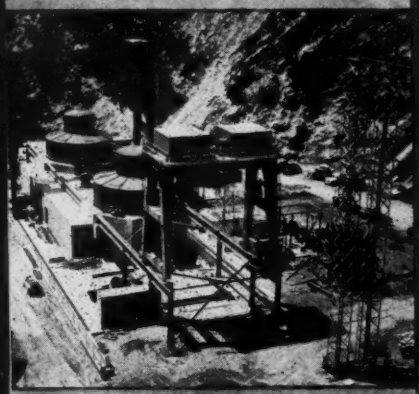

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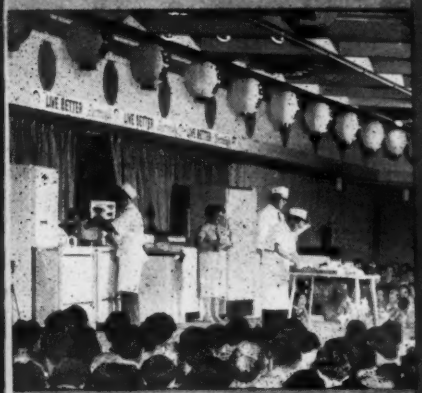

HECO Speaks Their Language . 91

ELECTRICAL WEST

December 1958
50 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Photo by San Francisco Examiner

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LUXURY ELECTRIC LIVING

...yours in any new home that bears this Medallion award!

The features a wife wants:

Modern All-Electric Kitchen is yours in any Medallion Home. Automatic electric range and oven are *already installed.*

Major Electrical Appliances—at least four of them, including the range—are part of the original house plan...located for convenience by the home's designer.

Proper Lighting is provided for in work, play and traffic areas, to illuminate them for beauty as well as for your family's safety and comfort.

The facts a husband needs:

Purchase Price Includes Appliances which are already installed. This important investment is not an out-of-pocket "extra."

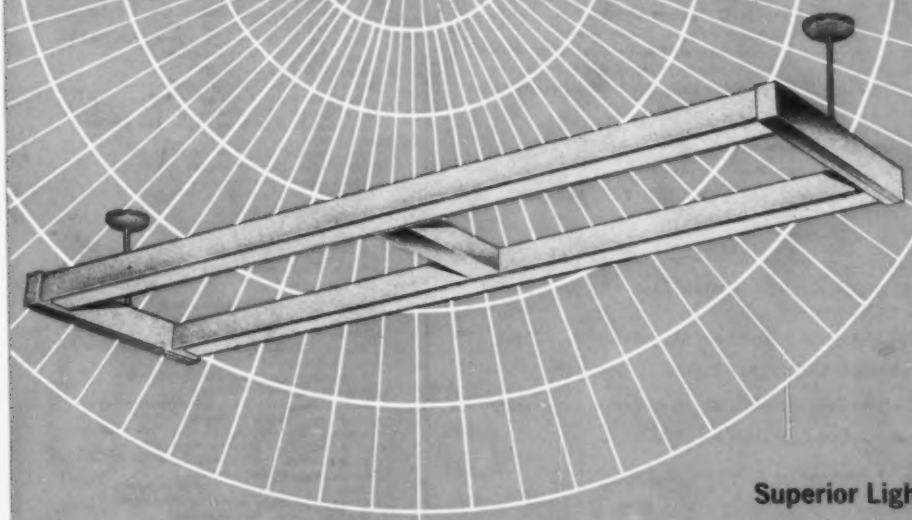
Full Housepower Wiring—a prime requirement in homes qualifying for the Medallion Home award—is ample to accommodate today's appliances *plus* those you will want in future years.

Resale Price Is Protected because an electrically modern Medallion Home will *stay* modern in the all-electric future. The Medallion Home award is your guide to today's best—*and safest*—new home buys.

The Medallion Home emblem is awarded only to new homes (and apartments) which meet all these standards of this nation-wide program for better housing.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY

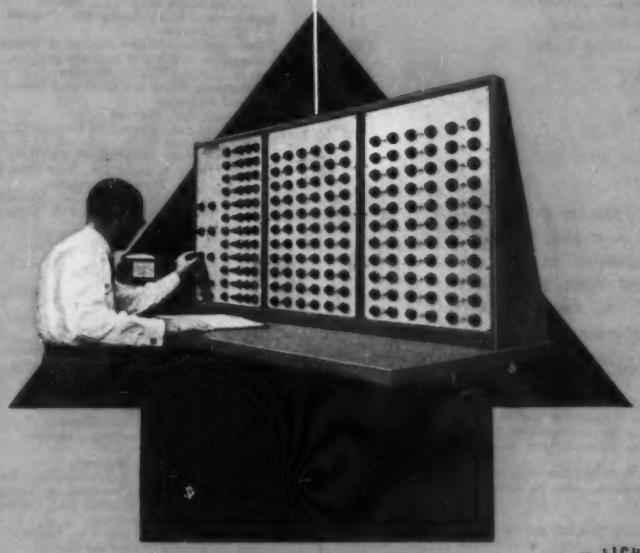
SMOOT-HOLMAN *LIGHTING FIXTURES*



Superior Lighting Performance!

Scientific Lighting Design!

MADE POSSIBLE BY THE NEW SMOOT-HOLMAN ANALOGUE COMPUTER!



Through the use of an advance design, analogue computer, Smoot-Holman research engineers are now able to design fixtures that give superior performance and are the ultimate in construction and efficiency. This new computer, the first of its type ever built for commercial use, solves problems of fixture design, as well as many other problems in the field of lighting. It's operation is based on the formation of an electrical network analogue of the distribution of light flux. Here is another example of Smoot-Holman's research and development to bring you *"Tomorrow's Lighting Today."*

SMOOT-HOLMAN COMPANY

Inglewood • California

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S. Established 1887

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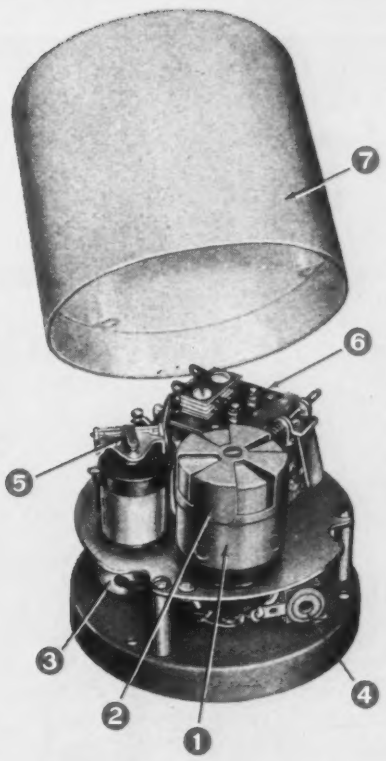
L-M'S NEW cadmium-sulphide photoelectric control fits standard EEI-NEMA heads with Twist Lock® receptacle or adapter available for straight prong sockets. Reliable research reports indicate that hermetically sealed cell assures long life—with contact life of 15 years or more. Factory setting 1 to 1½ footcandles; adjustable from ½ to 6 footcandles.



COMPONENT PARTS: (1) cadmium-sulphide photocell with broad active surface; (2) adjustable louver; (3) capacitor; (4) selenium rectifier—improves pilot relay action; (5) pilot relay, d-c type; (6) load relay with non-integrating time delay; (7) Tenite® II plastic housing, 4 x 4 inches. Other components, not visible, are resistor; lightning arrester, 3-prong locking-type plug—holds control firmly on head.

New L-M Tubeless Cadmium-Sulphide Photo Control—Dependable, Economical

Conservative operation of all components, and even light distribution over photocell's active surface, provide maximum life, trouble-free service.

L-M announces a new tubeless photoelectric control for incandescent, fluorescent, and mercury vapor outdoor lighting. The new unit, built by Tabet, achieves long life and reliable, economical operation by effective use of a new cadmium-sulphide photocell connected directly to a d-c pilot relay. The cell provides enough current to operate the relay with as little as one-half footcandle, without amplifying tubes or transistors.

The photoconductive-type photocell has a broad active surface and is hermetically sealed for stability. A unique adjustable louver spreads the light evenly over the entire active surface of the cell to insure long unit life. The plastic housing provides additional diffusion. The result is a control that is so economical, and requires so little maintenance, that it is practical to use a control on each luminaire.

Built-in Time Delay

The new Cd-S control uses magnetic pilot and load relays. The load relay provides positive non-integrating 5-second time delay, which eliminates transient operation by lightning flashes or traffic. Contacts are rated 1000 watts. The pilot relay is a time-proved d-c type which operates on low current.

Get Details From L-M

Ask the L-M field engineer or lighting engineer for more information on the many advantages of these new L-M cadmium-sulphide photoelectric controls. Or write for bulletin to Line Material Industries, Lighting Division, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

LINE MATERIAL Industries Outdoor Lighting

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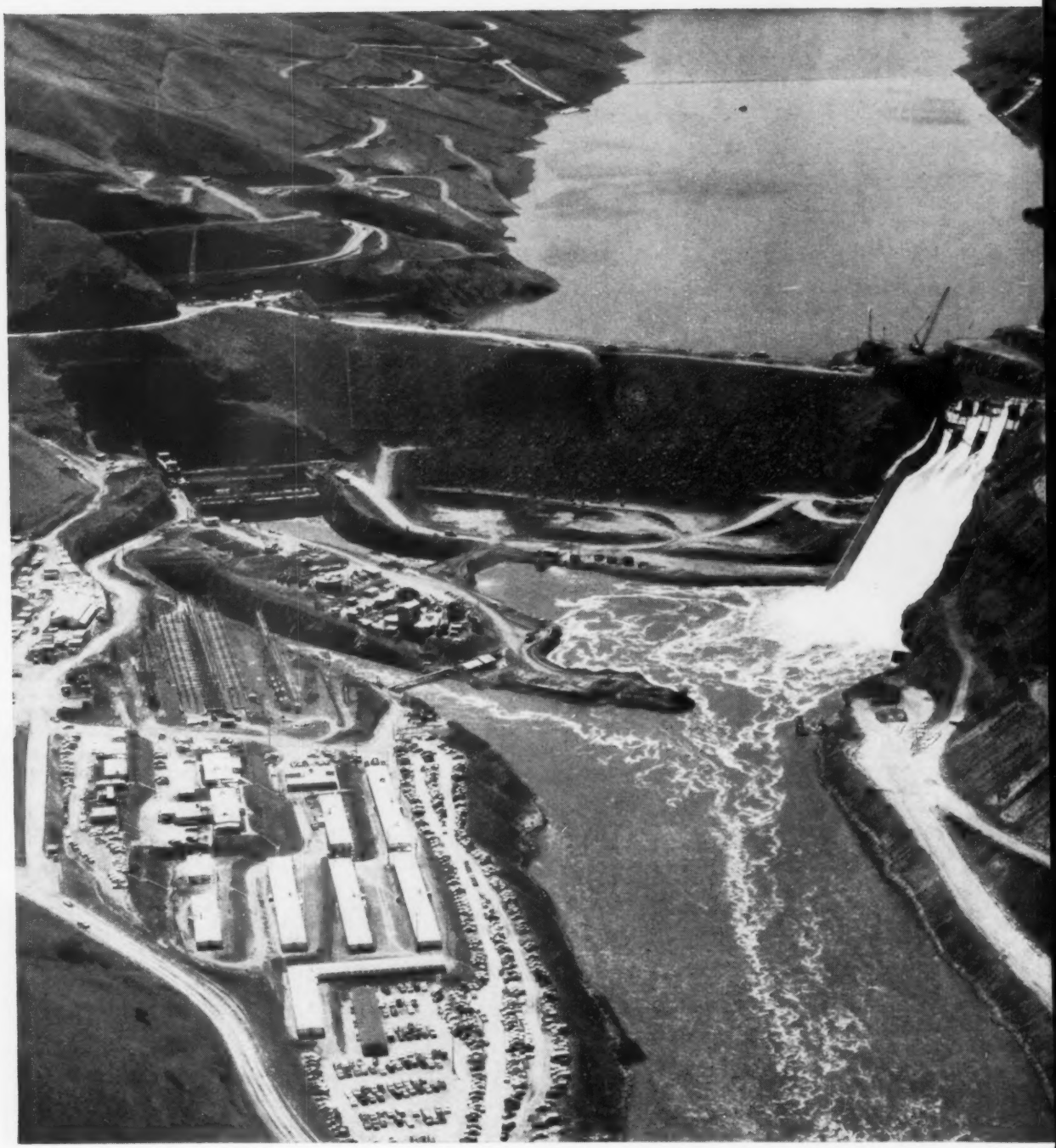


Technical assistance, dependable service by Alcoa help maintain schedule on first stage of 1,186,000-kw development

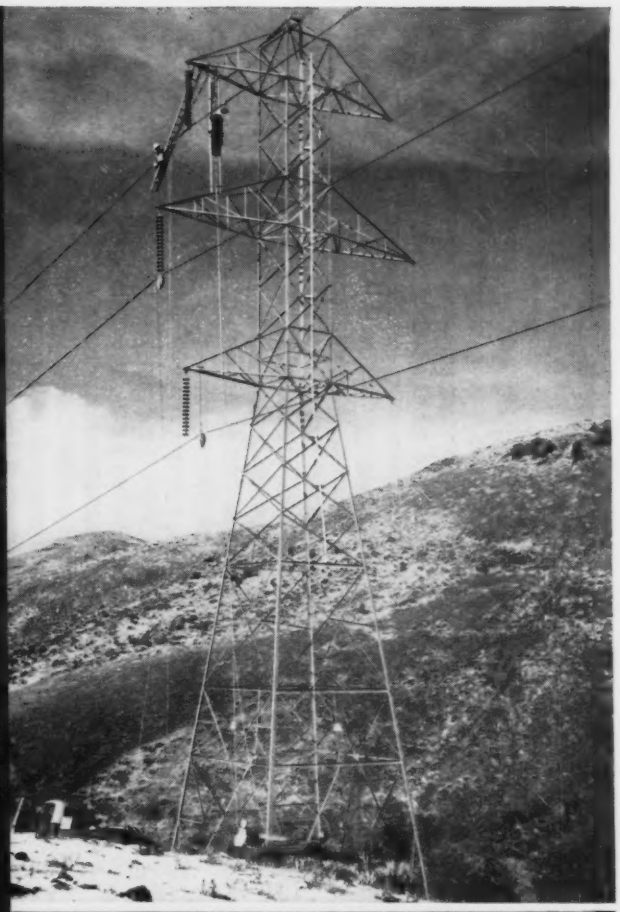
In a few weeks the first of four generating units will begin operating at Idaho Power's Brownlee Dam Project. Its completion signals a new era in the development of the power-hungry Northwest and marks the beginning of a farsighted program by Idaho Power Company to spark the region's economic growth.

Harnessing the roaring waters of the Snake River as they tumble through America's deepest gorge, the Brownlee Dam is the first of three giant hydroelectric projects which will be built in Hell's Canyon by Idaho Power Company. Because of the remote and rugged nature of the country, they each represent a spectacular challenge to engineering skill and resourcefulness.

All four of the generating units at Brownlee will be in operation by December 1958, little more than three years after construction began on the 400-ft rock-fill embankment that is the world's second highest. Initial capacity then will be 360,000 kw—a head start on the 1,186,000 kw which will ultimately be generated by the three dams.

A mushrooming network of electrical transmission is springing up at a furious pace to utilize Hell's Canyon's power. Alcoa® Aluminum Conductor will carry 230,000-volt power across miles of mountain wilderness. A new substation at American Falls, an expanded station at Boise and Brownlee's switchyard have Alcoa Aluminum Bus, Tread Plate and Pipe for wiring duct along with thousands of welded and bolted fittings—all made from Alcoa Aluminum.

IDAHO POWER COMPANY USES ALCOA CONDUCTOR TO HARNESS HELL'S CANYON'S MIGHTY MUSCLES...



(LEFT) World's second-highest rock-fill embankment at Brownlee Dam reaches a height of almost 400 feet, contains a 57½-mile reservoir on Snake River.

(TOP) Alcoa Aluminum Conductor spans lonely mountain wilderness between Brownlee Dam and Boise on more than 400 steel towers, each over a hundred feet high.

(BOTTOM) Alcoa Aluminum ACSR—in tension stringing equipment.

Alcoa, the pioneer in the development and manufacture of conductors and accessories for the electrical industry, was in a unique position to help with this Herculean undertaking. Because they were called in at the planning stages, Alcoa's experienced engineers were able to reduce costs and suggest ways to cut installation time. On-the-spot assistance by Alcoa's field advisor helped keep the job moving. Dependable equipment, delivered on schedule, minimized delays and overtime. For more information on how Alcoa's service before, after and during *any* job, big or small, can benefit you, call Alcoa or write Aluminum Company of America, 2308-M Alcoa Building, Pittsburgh 19, Pa.

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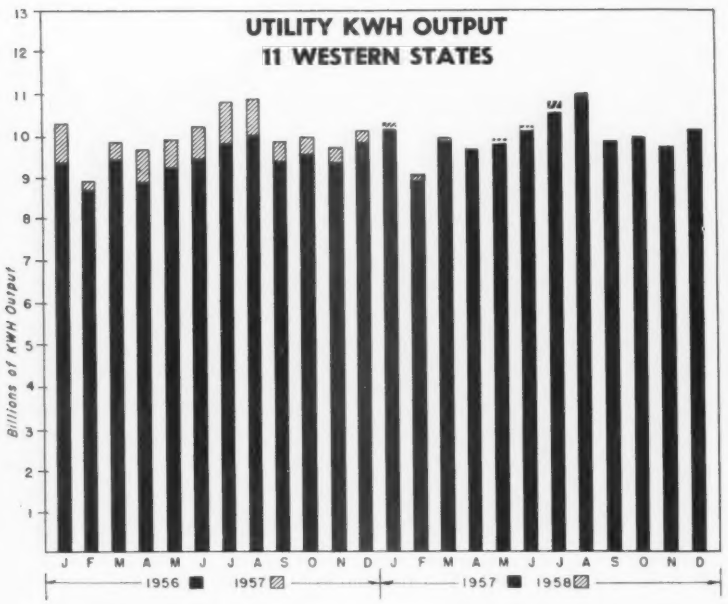
ELECTRICAL CONDUCTORS AND ACCESSORIES
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

----How're We Doing?



Output Comparisons

Year-to-year Kwh Output Changes in Western Regions and U. S.
Per Cent Changes Over Same Week One Year Ago

Week Ending	Rocky Mountain	Pacific Southwest	Pacific Northwest	U. S. Total
Oct. 4	+4.7	+ 9.2	−0.9	+4.7
Oct. 11	+2.4	+ 6.5	−2.4	+3.1
Oct. 18	+9.0	+11.8	−1.0	+3.1
Oct. 25	+9.7	+ 7.7	+1.6	+3.3

Earnings Improve in Third Quarter

Best since 1950, third quarter net income of **Westinghouse Electric** was up 11.5% from the second quarter of 1958, reaching a total of $19,038,000 or $1.09 per share. For the first nine months of the year, net income declined two-tenths of one per cent as compared with the same period of 1957 on a 6.3% decrease in sales billed. Earnings increased from 73c a share in the first quarter, 97c in the second.

Allis-Chalmers reported third quarter sales of $124 million, about 7% lower than in '57. Earnings after preferred dividend requirements were $4,929,106 as compared with $3,421,866 a year ago, or 60c and 42c respectively, per share. Nine-month sales totaled $393,748,854 in 1958; $419,354,514 in 1957.

Third quarter sales approaching the record level for 1957 were reported by **General Electric**. Sales were down 4%, earnings up 6% for the quarter as compared with last year. For the nine months, sales were 6% and earnings 11% below '57. Earnings amounted to $1.85 per share of common and 5.4c per dollar of sales for the three quarters of '58, compared with $2.10 and 5.8c respectively in '57.

H. K. Porter continued its gains in the third quarter, with net profits after taxes of $758,309 as compared with $592,025 for the first quarter and $654,017 for the second quarter. Earnings, however, were off from the near record of '57 ($4,602,072 for nine months). Nine-month sales: $99,143,686 in '58; $116,760,360 in '57.

Third quarter earnings of $412,176 compared with $278,836 for the same quarter in '57 were reported by **Thomas Industries.** Third quarter sales were $5,806,837 against $5,342,904 in '57.

Construction Highlights

Housing, including eight five-story apartment buildings and 32 two-story buildings, Marin City, Calif., $4,500,000.

Five-year plan for development of Blake Island, Seattle, Wash., to include two hotels, residences, shopping center, etc., $35,000,000.

Development project, Denver, Colo., to include two 12-story apartments, two medical-professional buildings, research building, stores, etc., $10,000,000.

Fertilizer plant, Kennewick, Wash., $4,600,000.

Fertilizer plant, Fresno, Calif., $9,000,000.

Shopping center, motel, offices, Albuquerque, N. M., $8,500,000.

Homes, 100, Kennydale, Wash., $2,000,000.

Civic center, San Rafael, Calif., $9,500,000.

Remodeling of civic auditorium into concert-convention hall, Seattle, Wash., $5,000,000.

Residence halls, San Francisco State College, San Francisco, Calif., $2,500,000.

Expansion program, including library, theater, conservatory, etc., College of the Pacific, Stockton, Calif., $10,000,000.

Hospital, San Leandro, Calif., $2,000,000; at Edmonds, Wash., $1,250,000.

Office and engineering building, Renton, Wash., $2,000,000.

Underground garage, San Francisco, Calif., $4,500,000.

Home for aged, Boulder, Colo., $1,900,000.

General administration building, Olympia, Wash., $2,000,000.

Auditorium, Bakersfield, Calif., $2,975,000.

Library, San Leandro, Calif., $1,750,000.

Hotel, Venice, Calif., $1,500,000; at Oakland, 22-story, $7,000,000.

Apartment development on 10-acre site, Tiburon, Calif., $3,000,000; in Los Angeles, Calif., 13-story, $3,000,000; in Burlingame, Calif., 3-story, $2,000,000; in San Rafael, Calif., $1,500,000.

Shopping center, San Diego, Calif., $4,200,000; at Roy, Utah, $1,500,000.

Reception-guidance center, vocation institute, Tracy, Calif., $1,900,000.

A unique feature of Rome's rigid steel conduit

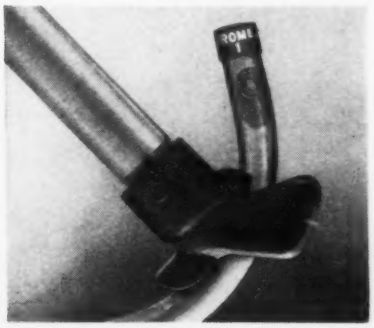
● Blue . . . 1", 2", 3", 4", 5", 6" ● Black . . . ½", 1½", 2½", 3½" ● Red . . . ¾", 1¼"

How you can save up to 20¢ per stub-up with Rome's size-imprinted thread protectors

Do your men cap conduit stubs in the usual but *costly* way?

Do they place a seal over the stub and cap it with a bushing? This is one way of doing the job, but the one or two minutes it takes can cost you up to 20¢ *every time a stub is capped.*

Now Rome's rigid steel conduit comes to you with unique *steel* thread protectors that eliminate capping time altogether.



Rome's color-coded, size-imprinted caps help you save three ways:

1. You can simply bend a stub-up with the Rome thread protector in place, then leave it. No time lost in searching for seals and bushings to protect the conduit from concrete, dirt or stones.
2. Rome's thread protectors are made of *steel* to prevent damage to the threads. They fit snugly enough to stay on the conduit, yet are easily removed without damaging either the threads or the protector itself.
3. You can see the piece of conduit you want at twenty paces. Rome's thread protectors are color-coded to give you easy and immediate size identification and the size is clearly printed both on the top and around the side. No time is lost searching through stacked conduit for a particular size.

These thread protectors are just one of the features that make Rome rigid your best rigid conduit buy. Specify Rome's conduit for your next job. Contact your Rome Cable representative for more information—or write to Department 947-R, Rome Cable Corporation, Rome, New York.

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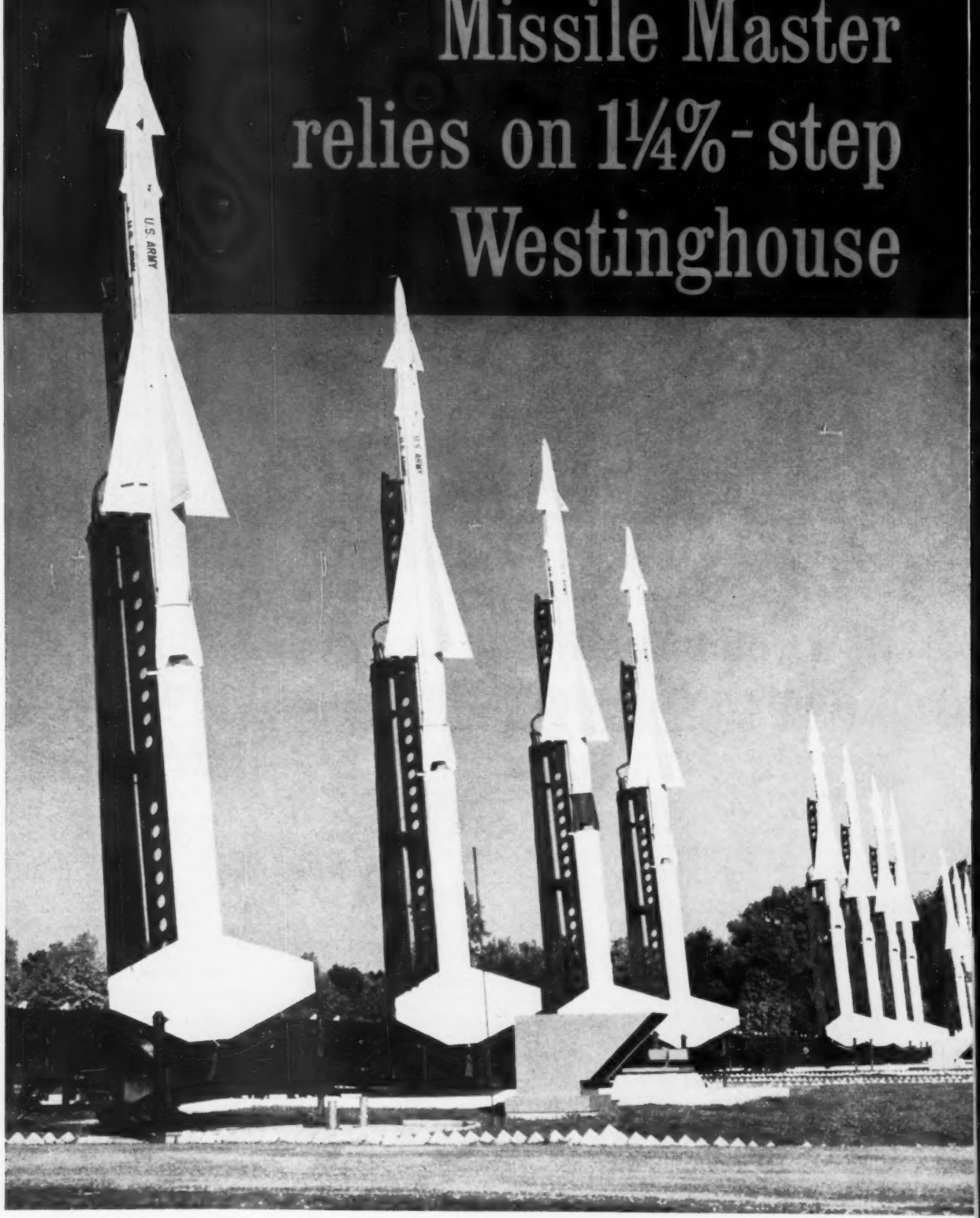
PROTECTING THE BALTIMORE-WASHINGTON AREA...

Missile Master relies on 1¼%-step Westinghouse



NIKE control system regulation of URL regulators

Missile Master, the first fully operational electronic air defense control system in the United States, now protects the Washington-Baltimore government-industry complex against air attack. Located at Fort George G. Meade, Maryland, Missile Master combines the latest automatic electronic equipment with human supervision at critical points.

Playing an important part in the functioning of the Missile Master installation are 30 Westinghouse URL voltage regulators. The URL combination of 1¼% steps, inverse time delay relay and instant response tap changer keeps voltages constant and reliable.

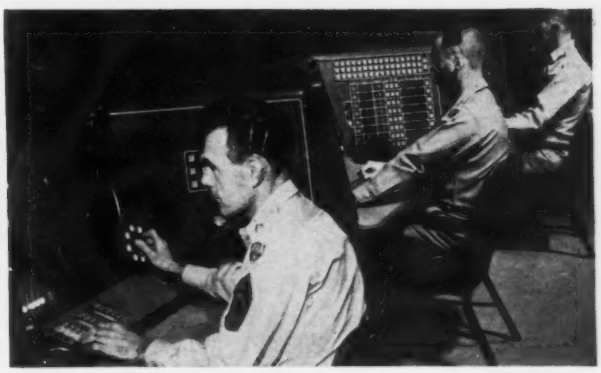
Developed by the U.S. Army Signal Corps Engineering Laboratories at Fort Monmouth, New Jersey, in conjunction with The Martin Company, of Orlando, Florida, this electronic system will control and coordinate the fire of the Army's air defense weapons to insure their maximum effectiveness.

The Missile Master collects information on the location and identity of aircraft, presents this information on electronic displays and distributes this data to the missile firing batteries. Thus, each NIKE battery receives continuous data on all aircraft within the defense area, and on the activities of other batteries. Each NIKE battery commander receives the information needed for proper target selection.

Ask your Westinghouse representative how this same reliability (from either URL or URF voltage regulators) can aid your power distribution system . . . can keep your voltages constant . . . can help you carry greater loads and produce more revenue. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J 70891

YOU CAN BE SURE...IF IT'S Westinghouse

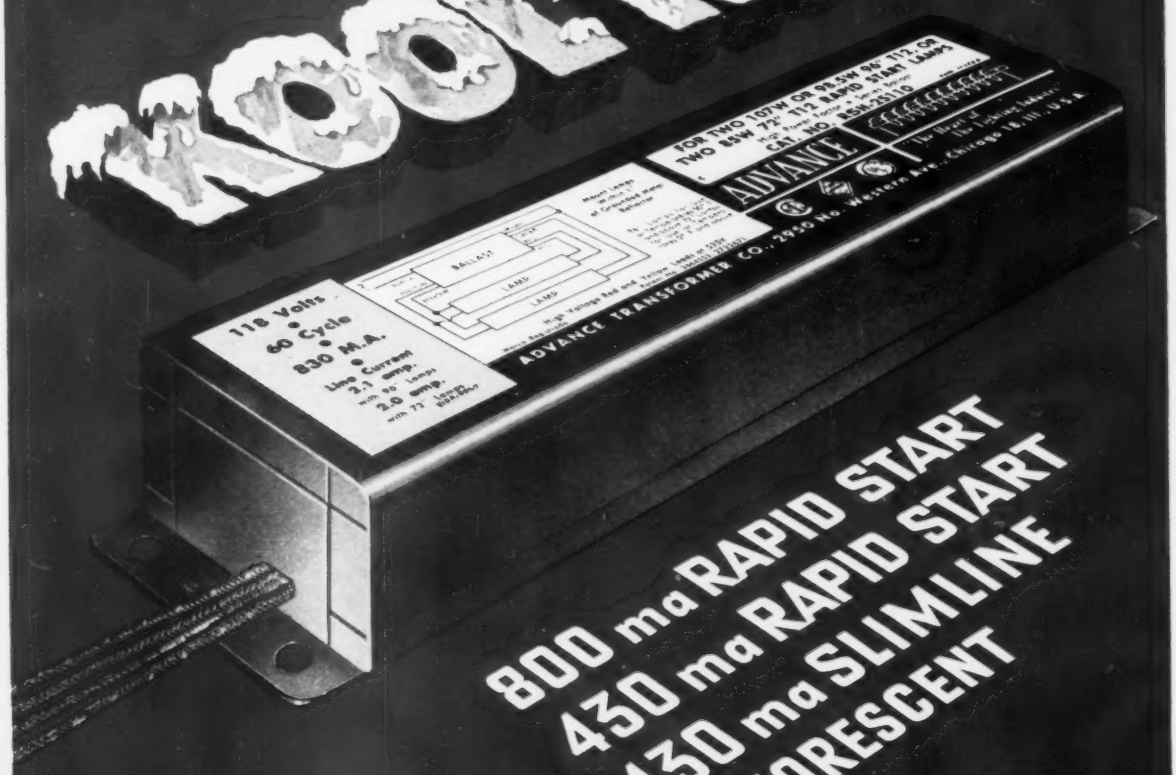
Mr. L. J. Huettel, Westinghouse representative, and Mr. B. J. Klaasen, of The Martin Company, inspect one of thirty Westinghouse URL regulators which supply reliable voltage to the Missile Master defense system.



U. S. Army technicians man "friendly protector" console, insuring that friendly aircraft are not fired upon by our missile batteries.

◀ A typical NIKE Ajax Surface-to-Air guided missile launching site.

KOOL KOIL



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TRANSFORMER CO.
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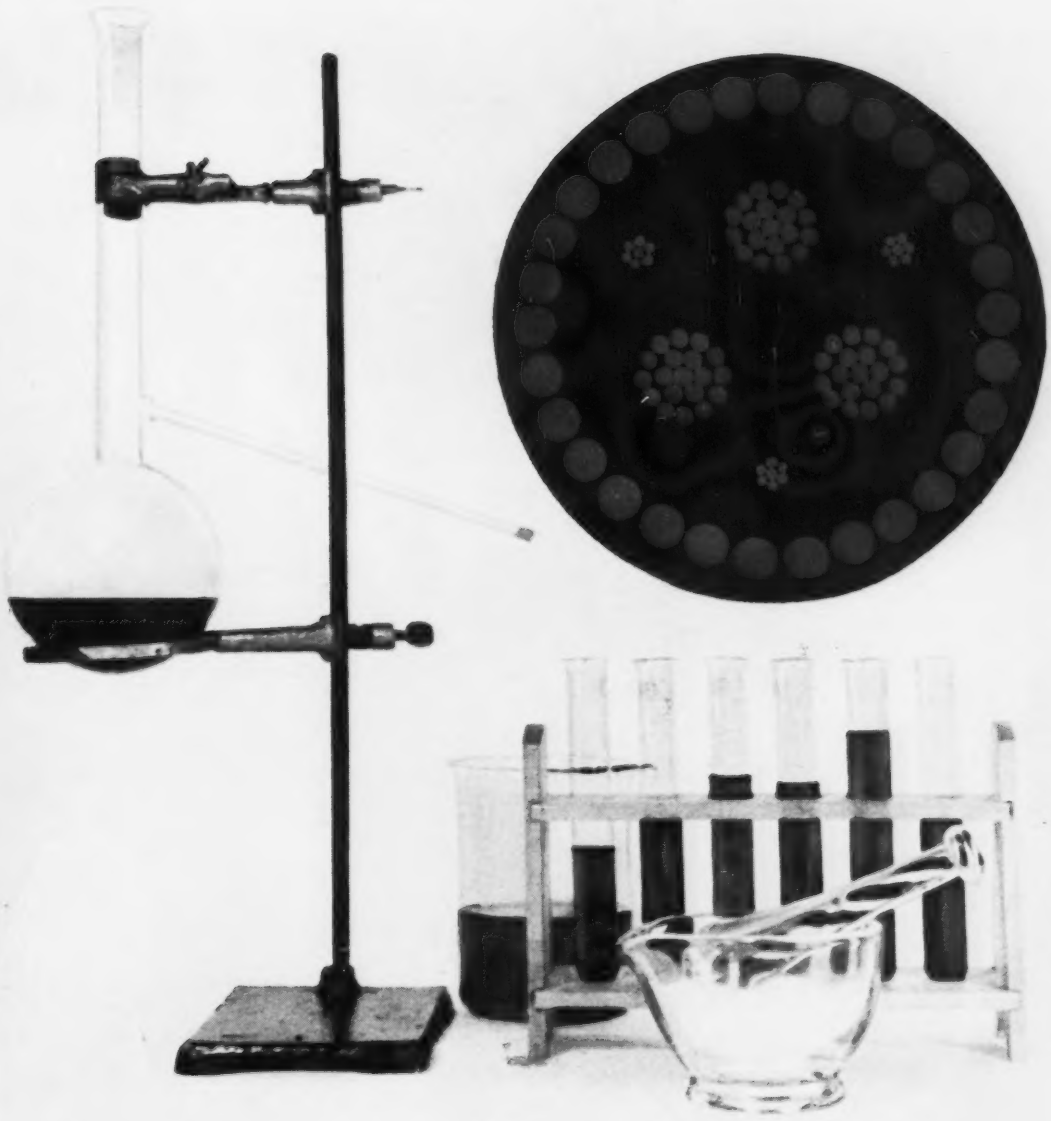


if *you want optimum cable service...*

—make it Kerite. For Kerite combines outer coverings developed from the research and development laboratories of today for use with the proved service ability of Kerite insulation.

Kerite cables are available in a wide variety of forms and sizes, with the most modern coverings to meet your specific requirements.

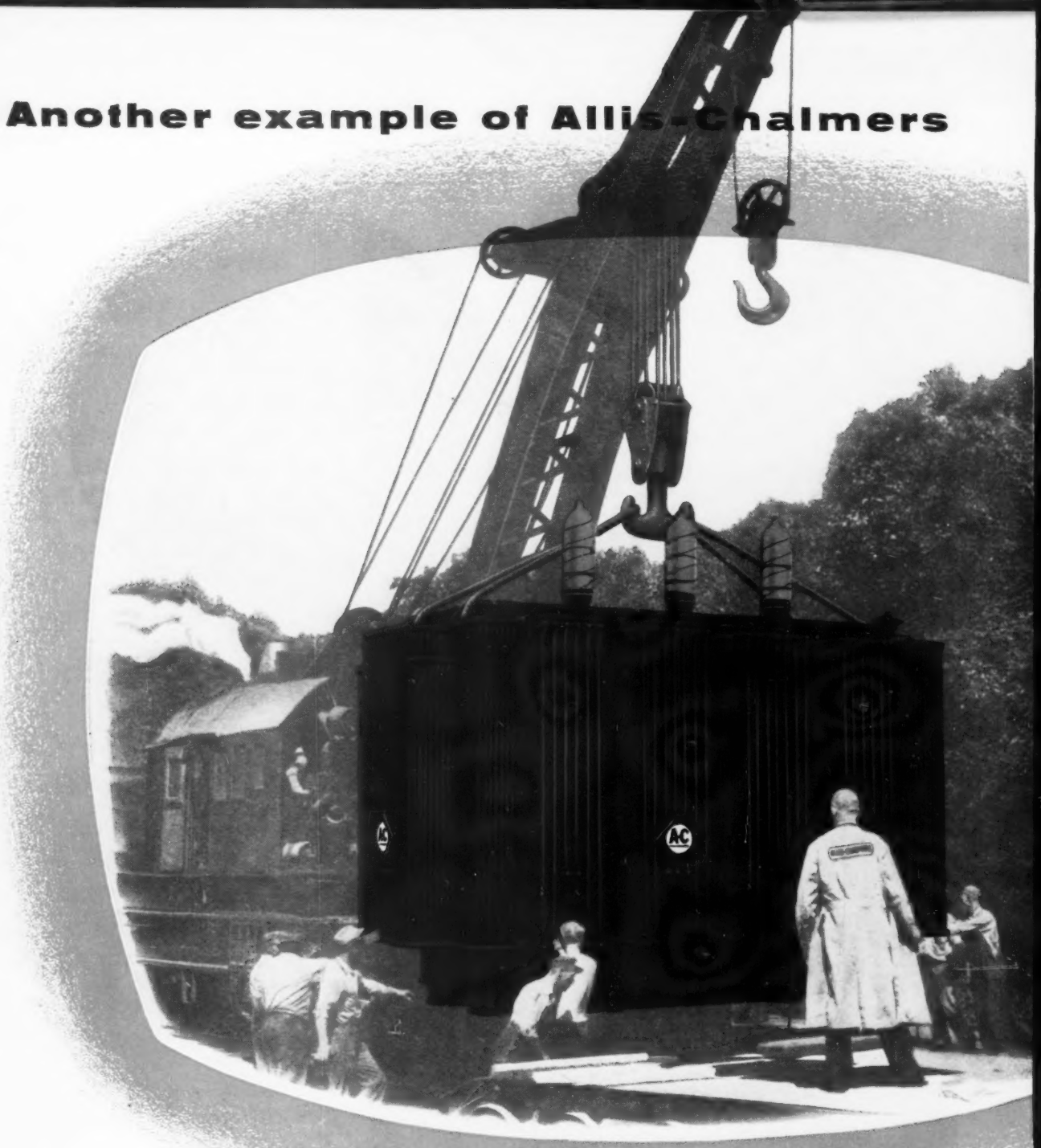
Our headquarters is at 30 Church Street, New York 7.
Branches in Ardmore, Pa., Boston, Cleveland, Chicago, Houston, St. Louis, San Francisco, Glendale, Cal.

KERITE CABLE

it's the **KERITE** *that makes the difference*

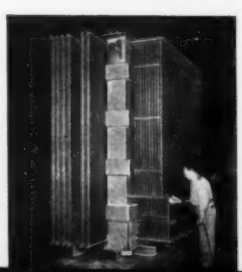
MEMBER

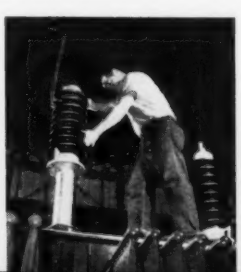
Another example of Allis-Chalmers



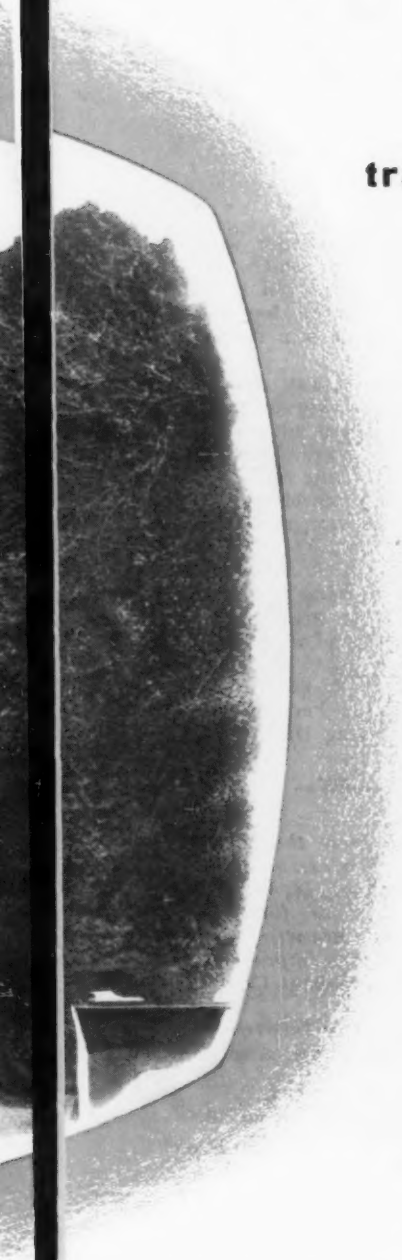
Balanced Design Once an Allis-Chalmers transformer is on the line, you can look forward to years of extra dependable service because *Balanced Design* includes: *Corona-Free* insulation, high impulse strength, uniform cooling, high short-circuit strength, weather-tight construction . . . and many other superior features. Ask your A-C man for all the details, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

Welded-on radiators are pressure-tested at the factory. Bushings are also installed at the factory to reduce installation time.





leadership in transformers



Large factory-assembled transformers moved from train into position and...

on the line in less than 4 hours

A. J. Becker
Field Engineer

"MANY engineers are pleased to learn how quickly large power transformers can be installed. When you check the timesaving features of Allis-Chalmers transformers, the reasons for fast and easy installation become obvious."

Factory assembly where shipping clearances permit is one important reason. Factory-installed radiators and bushings leave nothing to be done at the site except grounding the tank, connecting high and low voltage bushings, and completing system electrical test checks. Building transformers as large as 20,000 kva using this construction has become routine at Allis-Chalmers.

Ski-base helps save time also. It permits rolling or skidding in any direction. Turned-up ski ends ride smoothly on all types of rollers without gouging or digging in. Eyeholes in the corners of the base make winching into position easy. Corner jack lugs are designed with ample clearance, and are clear of cooling tubes.

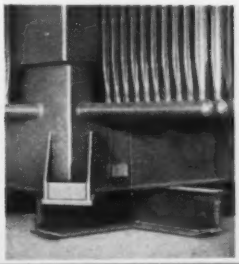
Another reason behind fast installation is the nation-wide staff of experienced Allis-Chalmers field engineers... like A. J. Becker, with 36 years of experience inspecting, testing and installing A-C transformers. These men *know* transformers. They offer on-the-spot guidance to make installation smooth and quick.

A-C ALLIS-CHALMERS

A 5694

Ski-shaped base of heavy I-beam cross supports permits moving in any direction. Reinforced clevis hole gives extra tow strength.

Ample jacking clearance and working space plus broad, flat surfaces for lifting jacks save hours of installation time.



EW news roundup

TRIPLE DUTY – Wall or ceiling panels, perhaps no thicker than a picture frame, may some day cool a home in summer, heat it in winter and light it the year round. The first experimental model of such a three-purpose panel was recently revealed by Dr. J. A. Hutcheson, vice-president in charge of engineering and research for Westinghouse.

Combined into the single panel are thermoelectric refrigeration and electroluminescent lighting. Thermoelectric refrigeration produces cooling in certain solid materials directly from the flow of an electric current.

The new panel is composed entirely of solid-state materials and has no moving parts. It produces as much light as a 25-w light bulb, can maintain a surface temperature approaching that inside a household refrigerator and, by the flick of a switch, can raise the surface temperature to about 130 F—a temperature suitable for radiant heating.

—EW—

"The Line," a publication of Line Material Industries, can boast one of the best joke pages that reaches the Electrical West office. An example:

Overheard on the bus: "I'm so full of penicillin that if I sneeze I'll cure somebody."

—EW—

ADVISERS – Two Westerners who will serve on the new special advisory committee to the AEC are James Black, chairman of Pacific Gas and Electric Co., and Eugene Starr of Bonneville Power Administration.

—EW—

One happy note from the Nov. 4 election as far as the electrical industry is concerned was the election of Mark O. Hatfield as governor of Oregon. The 36-year-old Republican defeated Democratic Governor Robert D. Holmes, who has had close alliance with the National Hells Canyon Assn. and other public power forces.

—EW—

DISAPPOINTMENT – Researchers at Colorado State University, knowing that chickens will lay more eggs when nighttime is eliminated with electric illumination, decided to see how the same thing would affect the output of milk cows.

The results? Detailed records kept on two groups of 17 cows for six months reveal there is no difference in their milk output or in their feed consumption.

Cross this off your loadbuilding list.

Working on the theory that the scientists of the future should have their interest aroused at the elementary or junior high school level, a California company is producing kits like the one pictured above to stimulate this interest. There is a whole series of new products on the subject of electricity. The model Hydroelectric Dam and Generator Kit pictured is an example. An intake tower controls the flow of water through the penstock to operate the turbine generator. Six volts a-c current are generated—sufficient to light a lamp, ring a bell or operate a small d-c motor. Accessories include a rectifier and d-c motor, transmission lines and transformer, ammeter, voltmeter, a hydraulic kit and a kit for teaching magnetism. These interesting educational aids are manufactured by Product Design Co., 2796 Middlefield Rd., Redwood City, Calif.

LIFESAVER—The valor award of the Interior Department was earned at great risk by Harold H. Heath, clearing and construction inspector for Bonneville Power Administration.

During right-of-way clearing operations, Jack Dickinson, a contractor's employee, was cutting down a tree with a chain saw. It fell into an adjacent 115-kv line and the high-voltage current traveled down the wet bark of the tree, rendering him unconscious.

Heath braved the potential danger of further arcing to reach Dickinson and apply artificial respiration. Dickinson had stopped breathing but responded to the emergency treatment. In the hospital at Sequim, Wash., Dr. L. E. Paddock credited Heath with saving Dickinson's life.

—EW—

Available from the National Society of Professional Engineers, 2029 K St., N. W., Washington 6, D. C., are four Executive Research Reports:

No. 1—How to Improve Engineering-Management Communications

No. 2—How to Improve the Utilization of Engineering Manpower

No. 3—How to Attract and hold Engineering Talent

No. 4—How to Train Engineers in Industry

—EW—

TIME SAVER—Three men can do in seven minutes a job that up to now has required from six to 13 men, four to 24 hours, thanks to research by the industrial research division of the Washington State College Institute of Technology.

Benefactor of this new process will be the lumber industry. The product that can be turned out in seven minutes now is a weatherproof laminated beam.

Besides the time and labor saving, the new laminating press incorpor-

NOW FROM CAROL...

A Complete Line of

AF WIRE

in profit-minded packaging

Here it is . . . a complete line of Asbestos Fixture wire in the same high quality as other well known Carol Cable products.

PRACTICAL PACKAGING • Carol's new distinctive striped carton identifies contents at a glance. Each heavy-duty carton contains the *right* number of spools for the gauge, keeps weight to a practical limit for easier handling.

GAUGE	SPOOLS PER CARTON	APPROX. WT. OF PKG.
18	2	11
16	2	17
14	2	21
12	1	35
10	1	55

COLOR CODED LABELS • Gauge, color and contents show at a glance. Saves time, simplifies inventory. Eliminates costly errors in identification and shipment.

AVAILABLE IN 18, 16, 14, 12 and 10 gauge, in black, white, red, green, blue . . . from a network of warehouses across the country.

When you call for cable, call for Carol

Carol®

CAROL CABLE COMPANY • Division of the Crescent Co., Inc., Pawtucket, R.I.

INDIANA STEEL & WIRE CO. MUNCIE, IND.
Crapo Galvanizing
Signs along the lines of Crapo GALVANIZED STEEL STRAND PERFORMANCE
For dependable performance . . . insist upon Crapo Galvanized Steel Strand. Superior tensile strength, combined with long-life, ruggedness and workability, makes Crapo Steel Strand first choice for guys, messenger and overhead ground wire.
The famous Crapo galvanizing process provides dependable protection for the steel, prolongs the expectant life of the strand.
• Low maintenance cost
• Laboratory tested and controlled quality
• Meets highest quality standards
• A size and grade for all practical needs
• Contact your Crapo Jobber Today!
INDIANA
STEEL & WIRE CO., INC.
Muncie, Indiana

EVERSTICK ANCHORS

For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

ates the use of straight phenolic resin instead of mixtures, and has a more efficient system of applying the adhesive. Cost of adhesive in the new process is cut to about one-sixth of present cost of glue.

Norman H. Shoup and Kalman L. Pell, mechanical engineers with the industrial research division, designed the new press.

—EW—

MIDGETS – Westinghouse Electric Corp. has applied electroluminescence to develop a tiny lamp for stairways, halls or other places where a night light is handy. Rated at 1/200th of a watt, the lamp will operate for a year for about a penny. It will cost about $1.

In existence, but not yet on the market, is a miniature television set that will be manufactured by General Electric Co. Hardly larger than a cigar box, the TV set has a tube that measures 8 in. diagonally. It weighs about 10 lb.

—EW—

One person dies accidentally on the job every 37 minutes, according to the National Safety Council. A work injury is suffered every 16 seconds.

Dr. T. C. Tsu, aerodynamicist at the Westinghouse Research Laboratories in Pittsburgh, Pa., examines a model of a solar-propelled space ship that may provide man's best transportation to nearby planets. Dr. Tsu's calculations indicate that the sail, made of aluminum foil or very thin, lightweight plastic, would be cheaper and lighter than any other means of propulsion now proposed

GIANT – Now on the drawing boards of Allis-Chalmers engineers are plans for a 404-mva transformer, probably the world's largest.

The transformer, ordered by Commonwealth Edison, will have an equivalent two-winding capacity of 404 mva: its low-voltage winding will be rated 385 mva at 12.6 kv; and two high-voltage windings, each rated 212 mva, will feed two 138-kv systems.

The unit will be forced-oil cooled with oil-to-air heat exchangers. Dimensions are: 40 ft long, 18 ft wide and 21 ft high. It is scheduled for delivery in 1960.

—EW—

The 1959 Western Joint Computer Conference, to be held in San Francisco next March 3-5, has program space open for factual papers dealing with the newer applications of computer techniques. Correspondence concerning the conference is to be addressed to Box 381, Station A, Palo Alto, Calif.

—EW—

DUAL COOL—Cooling systems of a pair of 192,000-kva transformers, designed by Allis-Chalmers for Pacific Gas and Electric Co., are lashed up so that all coolers can be used on one transformer in case of emergency or maintenance requiring an outage of one of the transformers.

With dual cooling, either unit can carry 265,000-kva load.

The two units will be installed at PG and E's Pittsburg generating station.

—EW—

NO COMMENT—Believe it or not, Ray Neptune of Sturges & Associates, an advertising agency in San Carlos, Calif., is a good friend of the electrical industry. His work with the Hill Transformer Co. account led to the following deathless prose:

Here's a *shocking* story that is *current* in the *electrical field.*

A man came home very late one night. His wife met him at the door with the query, "*Wire* you *insulate?*"

He said, "I had a *brush* with the law.

"On the way *ohm* I saw a beautiful *Bell* (e) on the bus. She had such a *magnetic* personality I wanted to *meter.* I made *contact* but she put up *resistance.* At the *terminal* the *conductor* gave a *signal* for the cops *attenna*rrived immediately.

"They took me to the *circuit*

NEW!

NO LOAD TAP CHANGER* WITH *"FREE-ACTING"* ROTOR FOR AUTOMATIC, TRUE ALIGNMENT

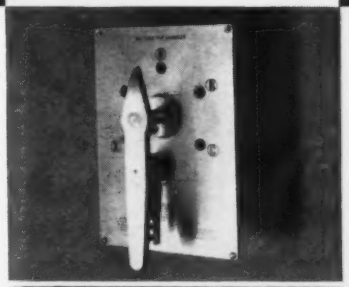
The new "self-aligning" tap changer now standard on all Kuhlman Substation Transformers puts an end to inefficient tap connections caused by misalignment.

The rotor contacts of the new tap changer function as a "free-acting" crosspin universal joint which eliminates the problem of misalignment between the rotor and stationary contacts. This "free-action" assures positive contact, true alignment always, and obsoletes the commonly used "flat surface" contacts which, by their construction, are subject to the faults of misalignment.

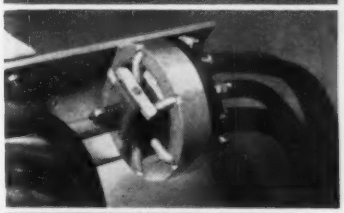
The new tap changer also features a new pistol-grip handle which locks in position and a quick-disconnect mechanism for simple, manual disengagement of the tap changer without the use of tools when untanking the core and coil assembly.

*patent applied for

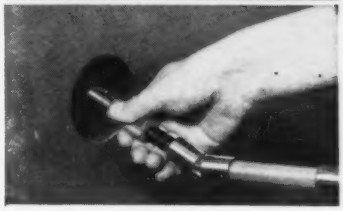
Here's how the new Kuhlman No Load Tap Changer Works:



The pistol-grip trigger release allows the handle to be moved to the desired tap position. The trigger plunger then snaps solidly into position where it can be padlocked if desired.



The "free-acting" rotor contacts, functioning as a crosspin universal joint, eliminate the problem of misalignment between the rotor and stationary contacts.



Tap changer can be disconnected for removing the core and coil assembly by a tongue and groove mechanism located inside the tank.

Get all the advanced features offered with Kuhlman Substation Transformers. Write today for our new bulletin CS-701.

KUHLMAN POWER TRANSFORMERS

KUHLMAN ELECTRIC COMPANY General Offices: Birmingham, Michigan • Western Division: SALINAS, CALIFORNIA

"EMT installation is easy when we use SPANGLEAM

says Al Wendt, Contracting Manager, Cannon & Wendt Electric Co., Phoenix, Arizona

Cannon & Wendt, electrical contractors for the Camelback Town & Country Shopping Center near Phoenix, Arizona, buy large quantities of SPANGLEAM EMT and SPANG Conduit annually. Why do they choose SPANG? Contracting Manager Al Wendt, explains some of the reasons.

"All SPANGLEAM EMT used on the Camelback job was clean and strong. It's dependable and tough and has good corrosion resistance. When inspecting the conduit before pulling wire, we found no burrs or snags. SPANGLEAM bends easily without kinking. We never worry about conduit failure when we use SPANG."

Electrical contractors know they can rely on top-quality performance every time with SPANGLEAM EMT. You get this job-tested quality when you use any SPANG electrical product. It's *quality-controlled* throughout manufacturing, uniform and easy to work with on any kind of job. Ask for SPANG and your nearby distributor will deliver your order in a hurry.

Wiring the shops at the expense of the tenants makes dependable wiring a must. Easy-bending SPANGLEAM EMT helps insure trouble-free wiring and electrical service, reports Mr. Wendt of Cannon & Wendt.

Designer: John Davis & George Sparling, Phoenix, Arizona
Architect: Sholer, Sakellar & Fuller, Phoenix, Arizona
Developer and Owner: Jare Strezek
Electric Contractor: Cannon & Wendt Electric Co.
Project Engineer for Cannon & Wendt Electric Co.: John Lathen
Electrical Engineers: Barney Hartley & Ernest E. Cannon
Spang Distributor: Brown Wholesale Electric Co., Phoenix, Arizona

SPANG CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
TWO GATEWAY CENTER, PITTSBURGH, PA.
District Offices and Sales Representatives in Principal Cities

Three-million-dollar, 80-shop Camelback Shopping Center uses 2000 feet of EMT in each store. Wiring serves lights, air conditioning, wall outlets and other electrical equipment.

court. The judge said, '*Watt* is he *charged* with?' The reply was '*Battery.*' He stated that this is happening with too great *frequency* and said I should be kept under *control* and should be given a *short* sentence. So they put me in a *drycell.*

"The judge then made *contact* with friends, and after finding I have good *connections,* said I should be *discharged.* This message was *relayed* to the jailer—and here I am."

—EW—

Under construction now is the Hawaiian refinery of Standard Oil Co. of California. Requiring about 8,000 kw of electric power, it is quite likely that it will become the largest customer of Hawaiian Electric Co.

—EW—

ABOUT BUSINESS—How many businesses are currently operating in the U. S.? Today, something in excess of 4,000,000.

Interesting facts show that 75% or more than 3,000,000 have fewer than four employees and 99.8% have fewer than 500 employees—the usual measuring stick of "small business." On the other hand, the top 1% supplies three-fifths of all of the country's jobs.

This "red hot" motor, operating at 950 F, demonstrates its temperature by grilling a steak in a matter of seconds. The motor is one of several built by scientists of Westinghouse to test the performance of a new system of insulation for electrical equipment required to operate at high temperatures

WHAT HAPPENED—A pre-Nov. 4 edition of the National Chamber of Commerce "Washington Report" states:

"Your vote may be more important than you think. The governor of one large state was elected four years ago by a margin of 11,125 votes out of a total of 5,110,351 votes cast."

Without a doubt, the Republicans of the nation are wishing they could once again see such a narrow margin.

—EW—

METER READERS, LOOK OUT!—Idaho Power Co.'s safety department recently published a comparison of injuries reported during fiscal 1957 and 1958. The result is a down trend in everything but injuries from falling, flying and sliding objects and from dog bites—up 300%.

—EW—

A pedestrian is a husband who didn't think the family needed two cars.

—EW—

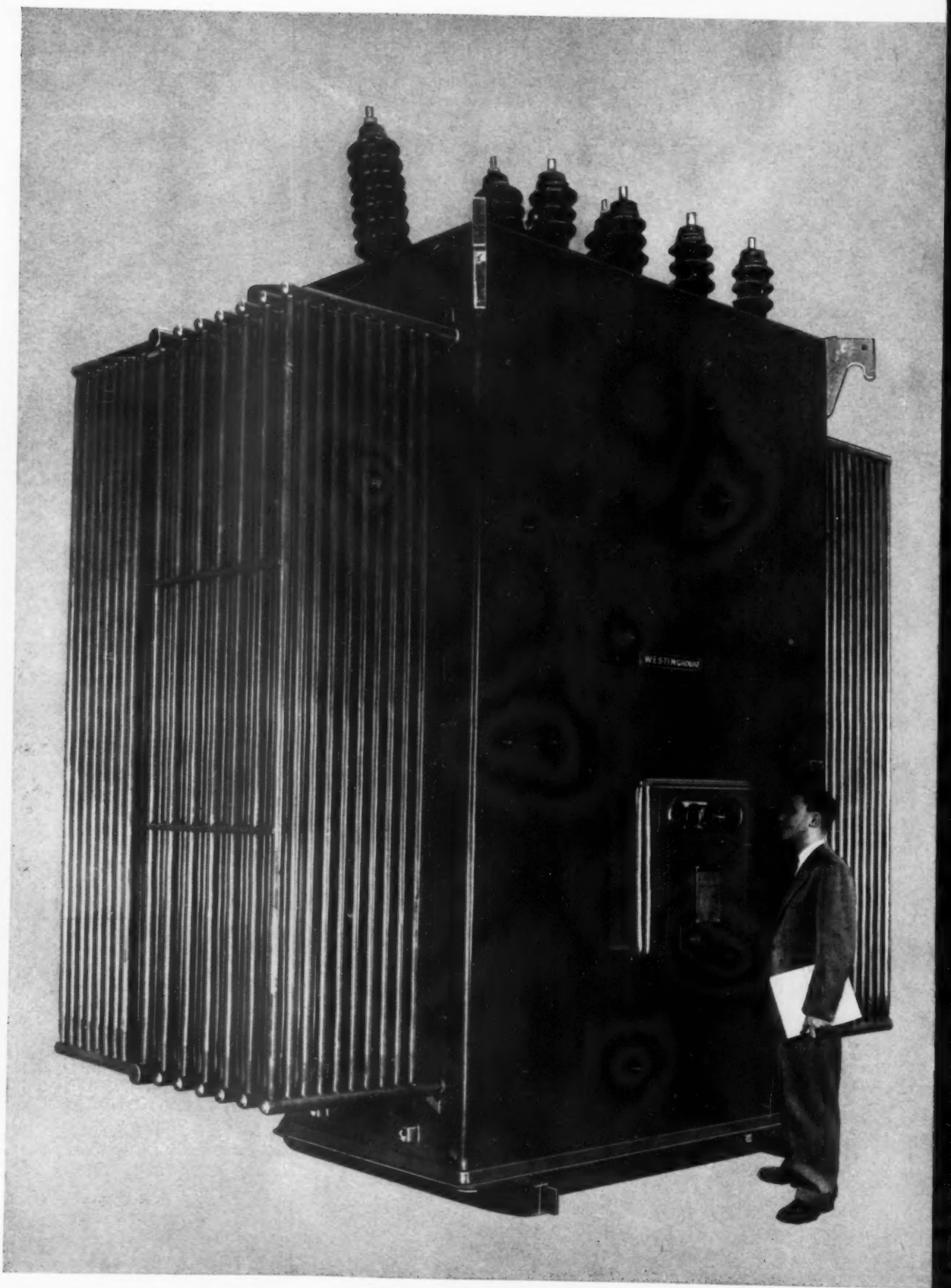
Also, there are two periods in a man's life when he doesn't understand women: before and after marriage.

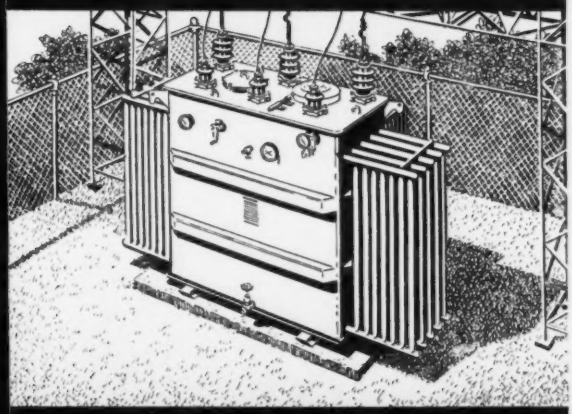
Are You Building a "Creative Climate"?

	True	False
1. The efficient producer today will automatically control tomorrow's market.	.....	.....
2. There is no such thing as an extemporaneous speech.	.....	.....
3. The specialist is more likely to operate on a top management level than the generalist.	.....	.....
4. You are obligated to do creative thinking for your company	.....	.....
5. Nosey characters from other offices should stay out of my bailiwick.	.....	.....
6. It is better to be safe than sorry.	.....	.....
7. Efficient operation demands strict adherence to procedures. Ideas should be left to research departments.	.....	.....
8. Taking 10 minutes a day just to sit and think would produce many good ideas.	.....	.....
9. Management should protect the creative screwballs only when they come up with obviously good ideas.	.....	.....
10. "Suggestion" systems are more important as an emotional outlet for employees than they are as producers of better ways of operation.	.....	.....

(Answers are on p 107)

Harry F. "Pop" Hartzell, founder of Maydwell & Hartzell Inc., San Francisco, manufacturers' representative, sent us this evidence of the good time he had at Sun Valley recently. With him is James R. Kearney III, whose company (like "Pop" Hartzell's) needs no introduction to the electrical industry


WESTINGHOUSE



THROUGH PLOWBACK OF EARNINGS WESTINGHOUSE CONTINUES DEVELOPMENT OF BETTER, QUIETER DESIGNS WITH IMPROVED APPEARANCE

Mr. R. L. Schwab, Manager, Network & Power Transformer Engineering, inspects the new streamlined design transformer, available in ASA ratings 750 through 10,000 kva, 69 kv and below, 3 phase.

New Standardized Substation Transformer Line Promotes Utilities' Customer Relations

"BETTER NEIGHBOR"— IMPROVED APPEARANCE... NEW LOWER SOUND LEVELS

Westinghouse has developed a new line of substation transformers to answer the utilities' requirements for better looking, quieter transformers.

Urban growth — physical and electrical — has meant the location of more and more transformers inside residential areas. Several years ago, Westinghouse foresaw this situation . . . and the unitized substation was born. This was a step in the right direction — but still greater improvements in appearance and sound levels were desirable.

Now, here is a new transformer — attractive even in the center of a populated area. Here's how . . .

Streamlined, rounded tank corners afford better paint adhesion and coverage, stop ugly corrosion before it starts — less maintenance.

External braces are eliminated — no place for debris to collect and start corrosion.

Random scattered location of gauges and valves eliminated — all accessories grouped in a weatherproof, tamperproof enclosure located at eye level. Instruments are easily accessible and can be read through protective window.

Performance-wise, too, the new transformer has been improved:

Improved mechancial strength — to meet severe shock and stresses imposed by modern electrical systems.

One-piece cover and tank is bottom welded — easier untanking if ever required.

Less maintenance — cleaning and repainting are simplified by elimination of external braces.

Lower sound levels — complete line is designed to meet new lower standard sound levels.

Faster delivery possible through complete standardization.

For the full story of this substation transformer, call your Westinghouse representative . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Penna.

J-70882-R

Serving the West from Sunnyvale, California.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

A Job for Paul Bunyan...

Building Swift Dam on the Lewis River in southwestern Washington is the type of project that would have appealed to Paul Bunyan, the Pacific Northwest's legendary performer of giant tasks. For it will be the world's highest earth and rock-fill dam when completed—512 feet high and containing 16 million cubic yards of compacted materials.

Swift Dam and its adjacent powerhouse is being developed by Pacific Power & Light Company, Portland, and a companion powerhouse three and one-half miles downstream is under development by Cowlitz County Public Utility District #1, Longview, Washington, as an integrated project. The dam, the two powerhouses and other facilities will be completed near the end of this year—adding 274,000 kw capacity to supply the expanding power needs of the Pacific Northwest.

Working closely with power company and utility district engineers, Bechtel designed and engineered the entire Swift Project and is managing all construction.

BECHTEL CORPORATION

Engineers and Builders for Industry

SAN FRANCISCO · Los Angeles · New York · Houston

CANADIAN BECHTEL LIMITED

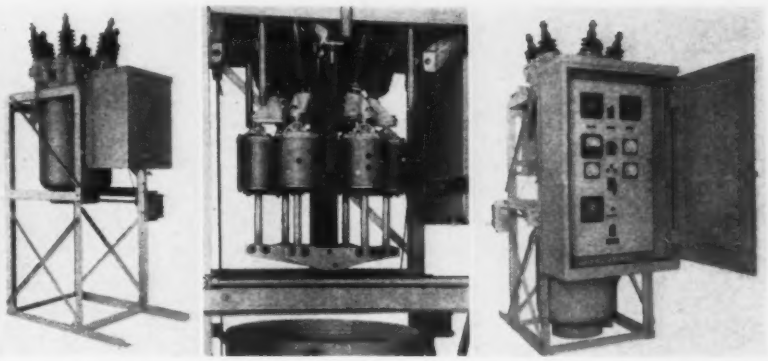
Toronto · Vancouver

PRODUCT NEWS

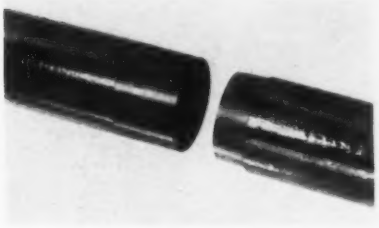
New Designs and Applications

Oil Circuit Breakers

(1) *Cole Electric Co.*, 8439 *Steller Dr., Culver City, Calif.*



This company is entering the oil circuit breaker field with its type FC oil circuit breaker, which is a three-phase, self-contained, solenoid-operated breaker available for either indoor or outdoor service. The operating mechanism is attached directly to the breaker in a plane normal to the three phases. If required, a relay cabinet can be mounted directly off the breaker. The breaker is available in 7.2-, 14.4- and 23-kv ratings, with respective interrupting ratings of 150, 250 and 500 mva. All are available with continuous current ratings of 600 and 1,200 amp. In the photographs, the front of the unit is shown at left; a close-up of interrupters, top linkage, movable electrodes and pull rod assembly—open position—in the middle; and a view of the rear is at the right.



Conduit With Coupling

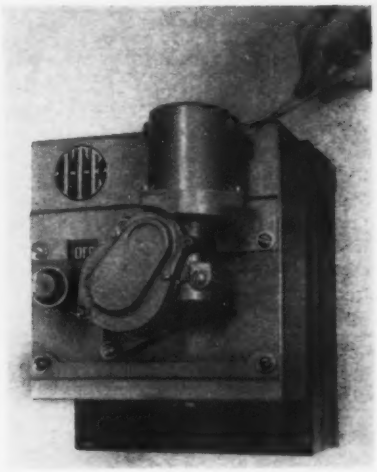
(2) *Orangeburg Mfg. Co. Inc., Orangeburg, N. Y., and Newark, Calif.*

This company has announced the availability of its standard fiber conduit—for concrete encasement—with a new-type flush coupling attached to each length at no extra cost. The new development is said to cut laying time up to 26% by eliminating assembly of separate couplings on the job. The new coupling is made from an exceptionally tough plastic especially compounded for the company and is said to produce a self-sealing watertight joint. It is an addition to the line, and other types are available with the regular tapered sleeve coupling.

Socket

(3) *Eagle Electric Mfg. Co.*, 23-10 *Bridge Plaza South, Long Island City* 1, *N. Y.*

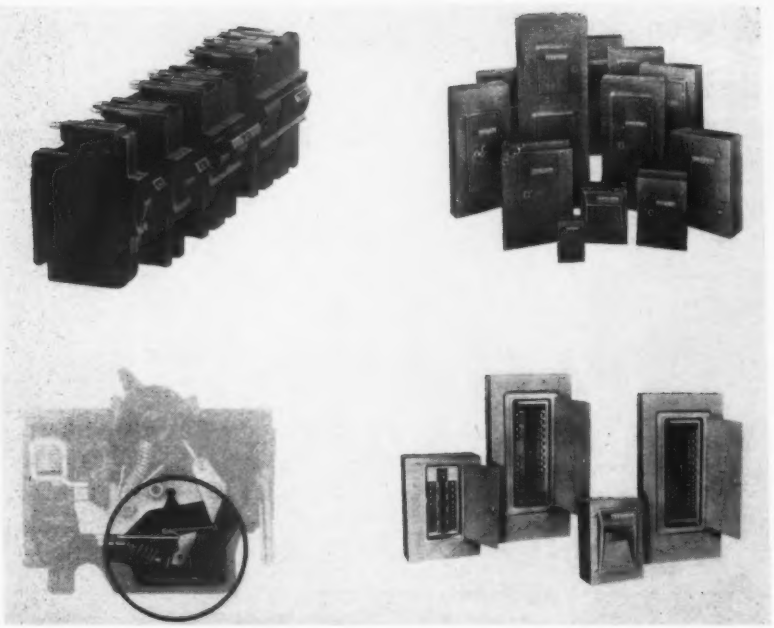
A design in the shape of the Liberty Bell complete with the motto "Proclaim liberty throughout the land," adds a novel touch to this socket. Called the "Attachon Socket," other features include easy wiring, one-piece construction, and it is said to be weatherproof. To wire the socket, the wires are laid in the proper position and then the top is twisted a quarter turn clockwise. Bolted to the device is a hanging hook.



Motor-Operated Breaker

(4) *I-T-E Circuit Breaker Co.*, 1900 *Hamilton St., Philadelphia* 30, *Pa.*

A motor-operated mechanism that makes possible both remote control and automatic transfer systems using molded-case circuit breakers has been introduced by this company. Designed for flexibility, the motor-operated mechanisms can be wired for any operational systems desired, and can be mounted on either new or existing I-T-E molded-case breakers without removing them from service. They add only 6 in. to the depth of the breaker. The new units are for use on circuit breakers in switchboards, control centers and individual enclosures, and any other applications where remote operation is needed.

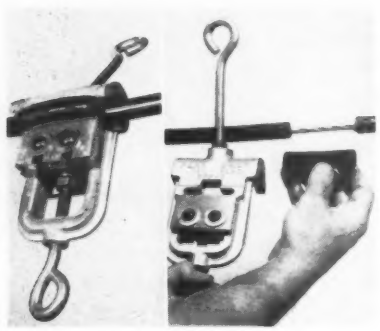


(5) Federal Pacific Electric Co., 50 Paris St., Newark, N. J., offers a new line of Stab-lok circuit breakers and enclosures. Upper left shows the circuit breakers, which have exteriors designed by Raymond Loewy Associates, industrial designers. A wider selection is available now. Upper right shows a group of enclosures in the new line. Designed by the same firm, the line now has E-slot construction to reduce the cost per unit circuit. Lower left shows the new coil magnetic trip featured in the line. Operating at 10 times current, it trips in less than ½ cycle. It is said to combine with thermal tripping, which is a feature of all Stab-lok breakers, to make the fullest possible protection for lamp and appliance cords. Lower right shows, from left to right, a new split bus panel that offers a "lighting main" installation choice, another split bus panel designed for electric heating, a main disconnect enclosure that is dual-rated for either single-phase or three-phase applications, and a new load center with up to 400-amp mains for single-phase or three-phase applications.

Silicone Rubber Tape

(8) *Minnesota Mining & Mfg. Co., Department D8-318, 900 Bush St., St. Paul 6, Minn.*

A new class H, completely inorganic, unsupported silicone rubber tape is announced by this company. It is coated with a silicone thermo-setting pressure-sensitive adhesive. The tape is designed for splicing silicone rubber-insulated cable, as a final wrap on stress cones, for insulating leads on large dry-type transformers and other applications where neither rubber nor plastic meets the requirements of temperature, corona or arc resistance. It has a dielectric strength of 700 v per mil, insulation resistance of 1,000,000 megohms, arc resistance of 135 seconds, and elongation of 600%. The tape can be used between broad functional temperature limits of −50 C to +180 C. When thermo-set at 500 F, a unified mass is formed with adhesion and solvent resistance increased many times, the manufacturer reports.



Insulation Peeler

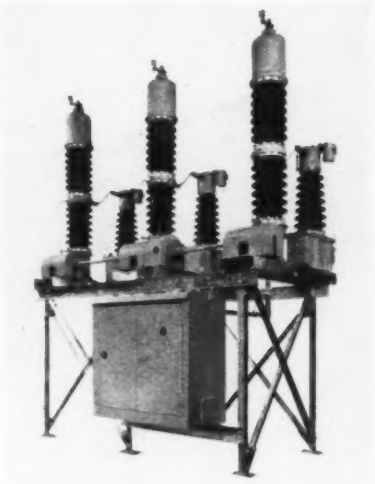
(6) *Penn-Union Electric Corp., Erie, Pa.*

A new tool offered by this company is designed to remove a 2½-in. length of polyethylene, PVC, rubber or neoprene insulations from 3/64ths to 12/64ths wall on conductors ranging from No. 2 stranded to 4/0 ACSR. One basic tool has interchangeable cutter blades for each conductor and insulation combination. The tool is hooked over the insulation, tightened up by hand or with a hot stick until a stop is reached, and is then rotated around the conductor. The insulation falls away exposing bare conductor.

Lighting System

(7) *Unistrut Products Co., 933 W. Washington Blvd., Chicago 7, Ill.*

Utilizing a variety of adjustable hanger fittings, a versatile metal channel manufactured by this company can be used for continuous runs or spaced fluorescent lighting fixtures. According to the company, this is done with reduced installation time and expense. No drilling, welding or riveting is required. Optional positions of the channel provide for the running of additional circuits. Access to wires at any point along the channel is achieved by removing a snap-in closure strip. Plug-in-type fixtures can also be used. The system is described in brochure FL-1.



Oil Circuit Breakers

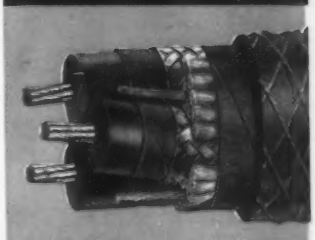
(9) *Schwager-Wood Corp., 8024 S. W. 35th Ave., Portland 19, Ore.*

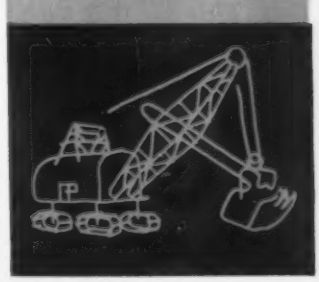
This company is entering the oil-type circuit breaker field with an initial offering of 69-kv breakers, 600- and 1,200-amp, with interrupting ratings up to 1,500 mva and interrupting time of five cycles. A newly designed compressed air mechanism suitable for high speed reclosing duty has been incorporated. These minimum oil-type circuit breakers were designed by Oerlikon Engineering Co., Zurich, Switzerland, and will

the more reason for using TIREX®

TIREX cords and cables give longest service when not subjected to severe abuse. But when required, TIREX can take it. In snow and mud, under water and under pressure, TIREX cords and cables remain flexible, smooth, light and easy to handle, thanks to their original cured-in-lead construction. They won't snag or tear, and their fortified and tempered neoprene armor gives balanced resistance to abrasion, water, acids, oils, sunlight and flame.

Millions of feet of TIREX are on the job everywhere—transmitting power for mobile mining equipment, construction machinery and portable tools.





Simplex WIRE & CABLE COMPANY

79 SIDNEY STREET, CAMBRIDGE 39, MASS.

"The American manufacturers of transoceanic telephone cables"

be manufactured by Schwager-Wood in Portland. Schwager-Wood also has the responsibility of servicing all equipment manufactured by Oerlikon or its subsidiaries and sold in this country. Features of the breaker are light weight, low oil content, simplicity of design and low maintenance costs.

Compression "T" Tap Connectors

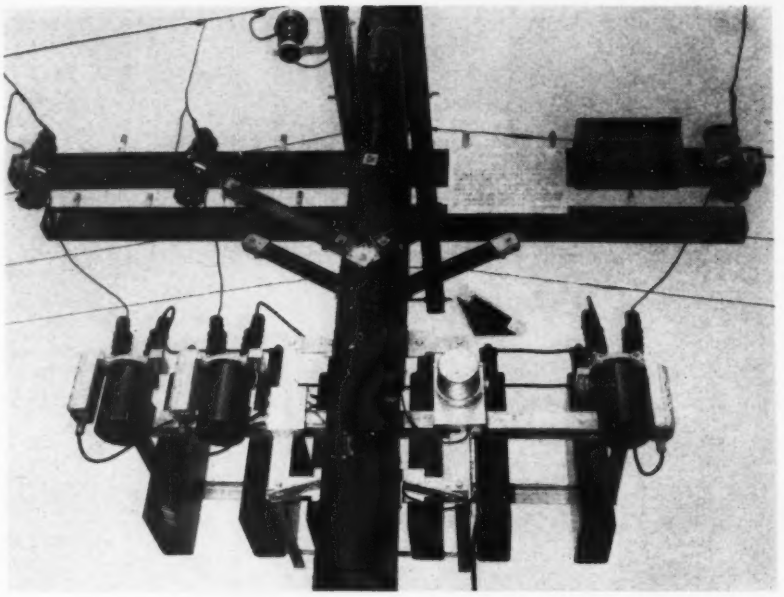
(10) *Anderson Electric Corp., Birmingham 1, Ala.*

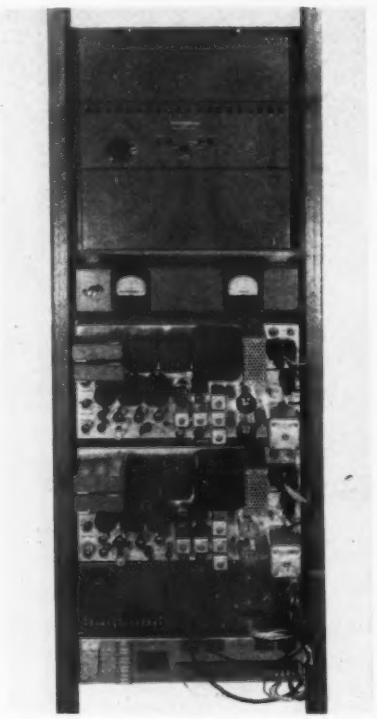
This company is offering a new line of DCT Compression "T" tap connectors for use with copper or aluminum primary transformer connections, transformer secondary connections or with secondary service drops. The line is available in 40 different sizes to handle cable combinations from No. 4 stranded through 400 mcm cable. Only three die sizes are required for use with the entire series of connectors. The line is supplied with a tap barrel that has been filled with Anderson inhibitor and then capped. The run and tap compression areas use the same compression die and are marked for indenting. Each connector is fully marked with cable sizes and die size.

Cable Spacer

(11) *John A. Roebling's Sons Corp., Electrical Wire Division, Trenton 2, N. J.*

This company offers Roeplastic cable used in conjunction with the new Roeclamp for use in areas where trees are a problem, where appearance is an important factor, or in areas where the most compact system is desired. The Roeplastic-Roeclamp combination is designed for 5-kv use and 8-kv use. Phase identification is positive at a glance, since cables are maintained in the same relative position along their entire length. Phases may be added or removed, and the system may be reinforced without removing Roeclamps from messenger. Conductors may be replaced without tools, except for splices and taps. Lightning protection and protection from falling tree limbs are provided by the strong Copperweld messenger, which runs the length of the system. Aluminum conductors come in 17 standard sizes and strand constructions to cover a broad range of applications. They are specially made with a greater number of finer strands to give extra flexibility. Standard insulation is extruded Roeplastic P-11R7, although other types of extruded insulations are available depending upon proposed usage.





Capacitor Switching System

(12) *Motorola Inc., Communications & Industrial Electronics Division, 4501 W. Augusta Blvd., Chicago 51, Ill.*

This company has introduced a new capacitor switching system providing a practical method of automatic, centralized control of remote capacitor banks in electrical utility systems. The switching is accomplished through transmission of code tones by carrier on the feeder lines to transistorized receiver-decoders located at the remote capacitor sites. A programmed coder unit and various accessory panels, besides the power line carrier transmitter, make up the central station equipment. A receiver-decoder unit is all that is needed at the remote locations. When system voltage or reactive measured at the substation bus exceeds preselected limits in either direction, the coder initiates action to add or remove capacitor banks from the line. Tone signals are transmitted by a standard Motorola 10-w carrier transmitter.

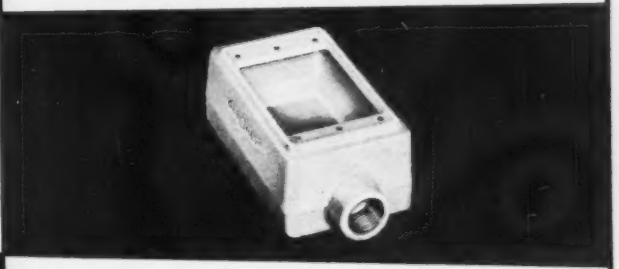
Cut costs... without cutting corners! Specify... GEDNEY CONDUIT BODIES

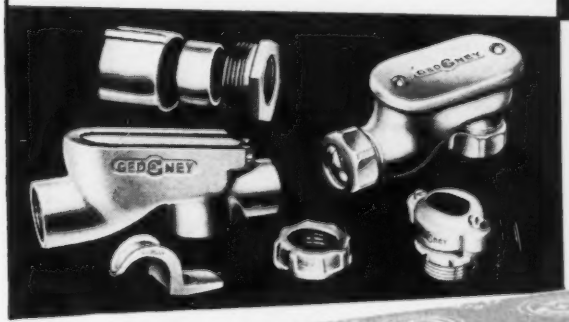
Gedney Conduit Bodies mean lowest installed cost! That's because they are skillfully made of tough, *malleable* iron, then hot-dip galvanized, and finally, they must pass the toughest inspection. Accurate machining and threading assure easiest installation . . . ruggedness assures longest service life!

THE GEDNEY CONDUIT BODY LINE INCLUDES ALL TYPES—SIZES ½" TO 4"

TYPE LB—Threaded—for heavy-wall rigid conduit. Use them with Gedney entrance fittings, straps, clamp backs to get an *entire* conduit system that is hot-dip galvanized.

TYPE FS—Threaded—shallow bodies for heavy-wall rigid conduit. Hot-dip galvanized finish prevents corrosive deposits—means easier installation, longer life.





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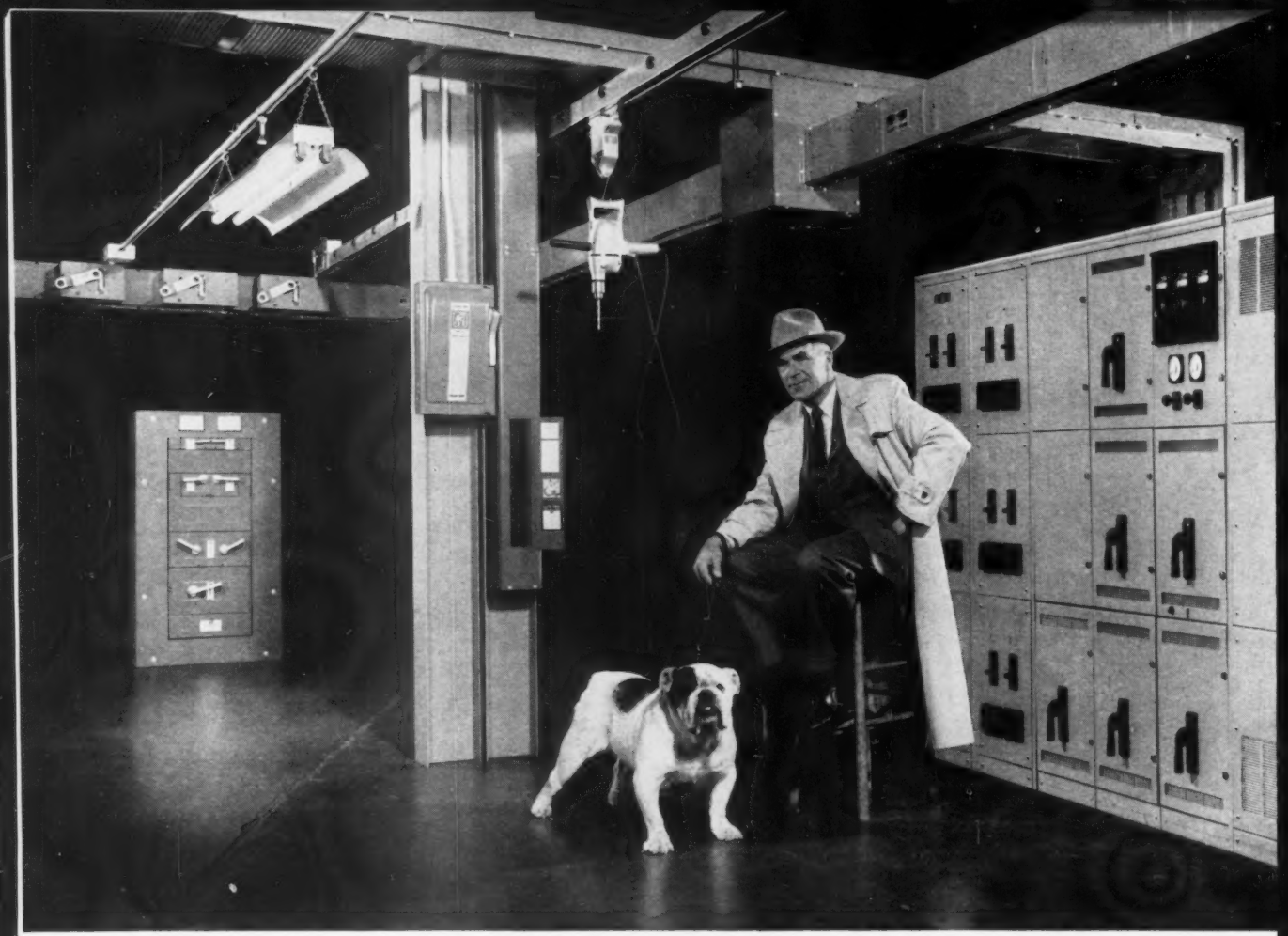
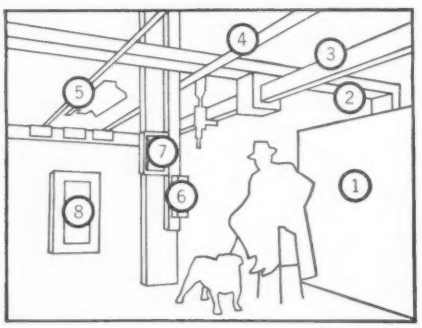


Electrical Planning—*key to efficiency and economy, too!*



PLANNED POWER on display—it's yours in a system of coordinated BullDog components. 1. Unit Substation and Unit-Versal® Switchboards. 2. Lo-X® Feeder Duct. 3. Plug-in® Duct. 4. Industrial Trol-E-Duct®. 5. Universal Lighting Duct. 6. Pushmatic Electri-Centers®. 7. Clampmatic® Safety Switches. 8. Power Panels.

Score yourself on how well you're using electricity. Is control and distribution of power getting its deserved emphasis in your power blueprints? Do your clients enjoy the benefits of a distribution system tailored to the needs of their operations—whether commercial, institutional or industrial? Such a system of BullDog equipment can and *does* provide greater efficiency, profitable use of personnel, and easy, economical growth.

Contact your BullDog field engineer for complete details on the advantages of a BullDog distribution system. Make sure your customers are powered up to meet a challenging future.

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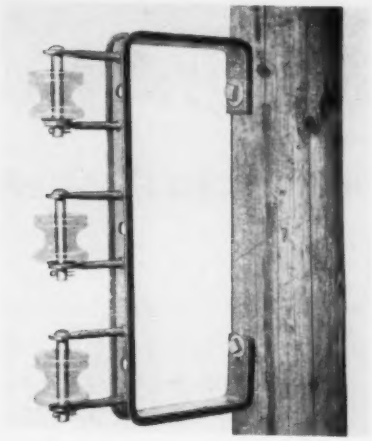
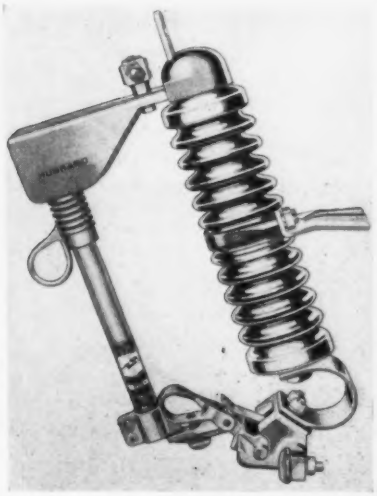


Extended Secondary Racks

(12) *Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.*

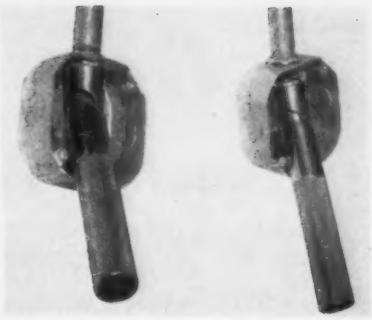
New one-piece, three-wire, forged-leg, extended secondary racks furnished with either 8-in. or 12-in. wire spacing are now available from this company. Individual clevis pins simplify installation of insulators.



Heavy-Duty Cutout

(13) *Hubbard & Co., 200 S. Michigan Ave., Chicago 4, Ill.*

A new single-vent, small-bore cutout, rated extra-heavy duty (10,000 amp at 5.2 kv and 7.8 kv, and 8,000 amp at 15 kv), is one of the first completed designs to come from this company's new electrical research laboratory. The problem of handling thrust from the single vent is solved with an absorbing recoil design.



Lock-Nut Wrench

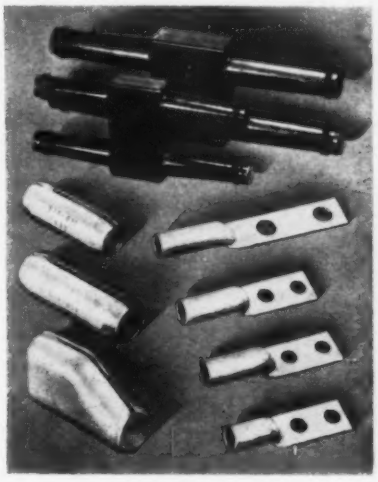
(14) *Topper Tools, 41 Perkin Dr., Arcadia, Calif.*

Called the Topper, this new tool is designed for use in hard-to-reach areas. Lock nuts for conduit are held in the tool by spring clips as the lock nut is placed in position. Its socket-type construction and jointed handle is said to simplify tightening.

Thinwall Fittings

(15) *Killark Electric Mfg. Co., Vandeventer & Easton Sts., St. Louis 13, Mo.*

This manufacturer announces that its aluminum fittings and fixtures for thinwall conduit are now available in sizes from ½ in. through 2 in. Only a screwdriver is needed for installation, since set screws provide the holding force.



Underground Fittings

(16) *Anderson Electric Corp., P. O. Drawer 2151, Birmingham 1, Ala.*

This company is entering the underground field with several lines of connectors and fittings. Three pictured here are: a type HU insulated compression connector designed for use in joining secondary network cables at junction points, the type HCL compression lug designed to accommodate copper cable from No. 6 through 2,000 mcm, and the split tinned copper connectors, represented here with the type SJA coupler and SJD single branch connector. The type HU is insulated with P-40 Performite rubber coated with neoprene. Available with four to 12 cable outlets. Installed with standard indent tools, as is the type HCL compression lug. The split tinned copper connectors are manufactured in accordance with the latest EEI specifications from high conductivity copper, hot dip tin plated, the manufacturer reports.

New Developments

► A development project to introduce aluminum strip winding to electrical coil manufacturers involves "tailor-making" of coils wound with aluminum sheet or foil. **Aluminum Co. of America** makes the coils to the specifications of manufacturers, and gives them to the firms for their testing and evaluation. Thirty designs have been worked on at this point.

► Reductions in guaranteed transformer losses, averaging 10% on all transformers 750 kva and up, have been announced by **General Electric.** G-E engineers estimate that the new loss guarantees will represent a saving of more than $1,000,000 to the utility industry in 1959 alone.

► Cost of cleaning large electric motors might be reduced as much as 75% through on-site use of nonflammable, nonexplosive and virtually nontoxic Freon solvents, according to tests conducted by the **Du Pont Co.** The Freon solvents will not attack insulating materials and varnishes used on motor windings.

► Five big power transformers recently installed at Consolidated Edison's Queensbridge substation in New York have sound levels almost as low as pole-type distribution transformers. The 70,000-kva units, with aphonic enclosure design, averaged less than 50 decibels when tested in **General Electric's** sound laboratory in Pittsfield, where the transformers were manufactured. NEMA standard noise level for transformers of this size is 80 db.

Wagner has the facilities and experience to build power transformers in kva and voltage ratings to meet your requirements.

from Wagner's

ANOTHER 230 KV TRANSFORMER

Westward bound—a 15,000 kva, single phase oil-immersed, water-cooled power transformer recently completed by Wagner. *High voltage:* 230,000 Grd. Y/132,800 volts. *Low voltage:* 6900 Delta volts. Provision is made for conversion to forced-oil-cooling to maintain 100% rating. This unit is part of an order for ten 230 KV power transformers.

Wagner has been building fine power transformers since 1893, and today's production brings you the benefits of the skills and experience gained during these 65 years.

Consult Wagner about your next power transformer requirements. Your nearby Wagner field engineer is at your service. Call him or write us.

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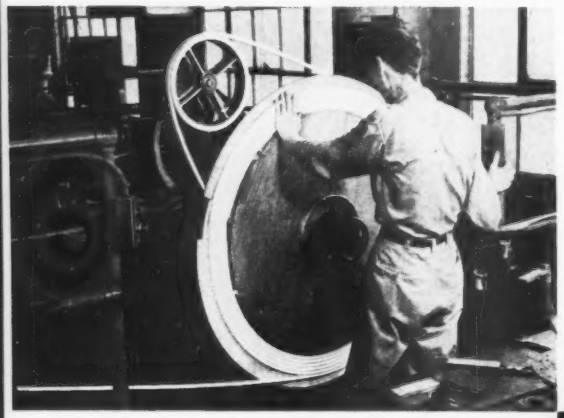
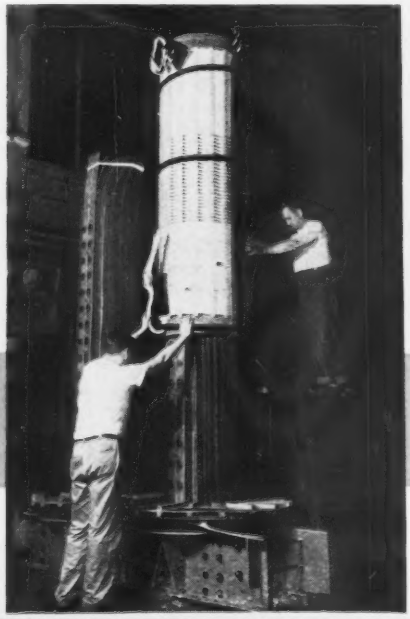
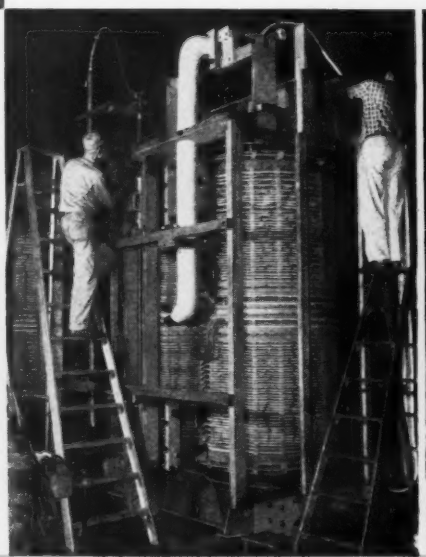


Two coils forming one double disk section of a high voltage buffer coil are wound simultaneously, with extra thick paper insulation.

The low voltage winding is placed over the core legs with the skill and precision of long experience.



WTSB-19



The completed core and coil assembly is locked rigidly into place—ready for the final insulating barriers.

Lowering the core and coil assembly into its tank is one of the many exacting jobs that are part of the day's work at Wagner.

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TO SERVE THE NATION'S POWER NEEDS

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BULLETINS ETC.

(17) FLEXIBLE CORDS—A new booklet combining technical information and a catalog of flexible cords and portable cables being offered by the Okonite Co., Passaic, N. J. Bulletin 1108 is a 64-page manual that deals with the company's Okoprene sheathed cords and cables.

(18) CONCRETE LIGHTING STANDARDS—Bulletin P-58 entitled "Marbelite Prestressed Concrete Lighting Standards" is now available from Pacific Union Metal Co., Box 2616 Terminal Annex, Los Angeles 54, Calif. The catalog provides detailed technical and dimensional information covering latest designs for street and highway lighting, new bracket details and a new line of precast bases.

(19) REFLECTIVE MARKINGS—A free booklet describing "Scotchlite" brand reflective markings for barricades, vehicles, equipment, poles and other public utilities equipment has been offered by Department R8-329, Minnesota Mining & Mfg. Co., 900 Bush St., St. Paul 6, Minn.

(20) PRICE LIST CATALOG—Just off the press and available to electrical contractors, distributors, engineers and architects is Leadlight Fixture Co.'s price list catalog. Write to the company at 800 100th Ave., Oakland, Calif.

(21) METALLIC TUBING—Product uses, features and manufacturing processes of electric metallic tubing by Rome Cable Corp. are detailed in a new 12-page bulletin now available without charge. Bulletin RCP-900 covers a complete story of electrical metallic tubing as it is produced in the Torrance, Calif., plant of Rome Cable Corp. Recommended applications are outlined. Write to Publications Division, Rome Cable Corp., Rome, N. Y.

(22) CAPNUT-STYLE POTHEADS—Bulletin AB on capnut-style potheads, available from G & W Electric Specialty Co., replaces listings on pages 6 through 36 inclusive of previous bulletin AB51. The catalog either lists a specific assembly for rubber insulated cables or suggests an alternate course to follow if a special listing is not available. Write to the company at 3500 W. 127th St., Blue Island, Ill.

(23) FEEDER VOLTAGE REGULATION—Bulletin GED-3468A, pocket size, 16 pages, gives examples of voltage regulation problems and applications on long and short feeders and outlines methods of using step regulators at reduced ranges of regulation with increased current capacity. For your copy, write to General Electric Co., Schenectady 5, N. Y.

(24) INCANDESCENT LUMINAIRES—A new catalog, SL1-1, now available from Line Material Industries, Milwaukee 1, Wis., gives complete descriptions, catalog numbers and prices on component parts for LINE 3 incandescent luminaires. Complete photometric and application information is contained in another bulletin, SL1.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

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DISTRIBUTION

Equipment News

In this issue . . .

- **ADDED KVA CAPACITY**

  for substations with new "Powermaster" Transformer, illustrated at left. See page 2.

- **LOW COST SWITCHING**

  with new G-E gas loadbreak cutouts. See page 4.

- **FIVE-COAT SANDWICH FINISH**

  adds life to Vaultmaster network transformers. See page 6.

HELPFUL PUBLICATIONS

Distribution Transformers

10 Reasons Why General Electric Is Your Best Transformer Buy—GEA-6070C

Self-protected Distribution Transformers—GEA-6126B

Lightning Arresters and Cutouts

New Form 3K Station Arrester—GEA-6794

Secondary Lightning Arresters—GEA-2977E

Open Dropout Fuse Cutouts—GEA-1816L

Flip Open Fuse Cutouts—GEA-4224E

Enclosed Fuse Cutouts—GEA-6208

Any of these publications may be yours at no cost by writing the General Electric Co., Section 431-83, Schenectady 5, N. Y.

GENERAL ELECTRIC

COMPACT NEW SUBSTATION TRANSFORMER design cuts installation space 29% over previous units.

New G-E "Powermaster" Transformers

Give pad and platform substations added kva capacity

Cooperation between the Detroit Edison Company and General Electric pays off for you with a new substation transformer design; the smallest, lightest, most efficient substation transformer on the market.

Rapid load growth in highly congested areas presented a recurring problem to Detroit Edison engineers: how could they get additional capacity where it was difficult to get space for more transformers?

Cooperating with Detroit Edison, G-E engineers solved the problem with a completely new 250-kva lightweight transformer for pole mounting. This prototype paved the way for an entirely new line of substation transformers which are easier to install, require less room, and possess improved operating characteristics.

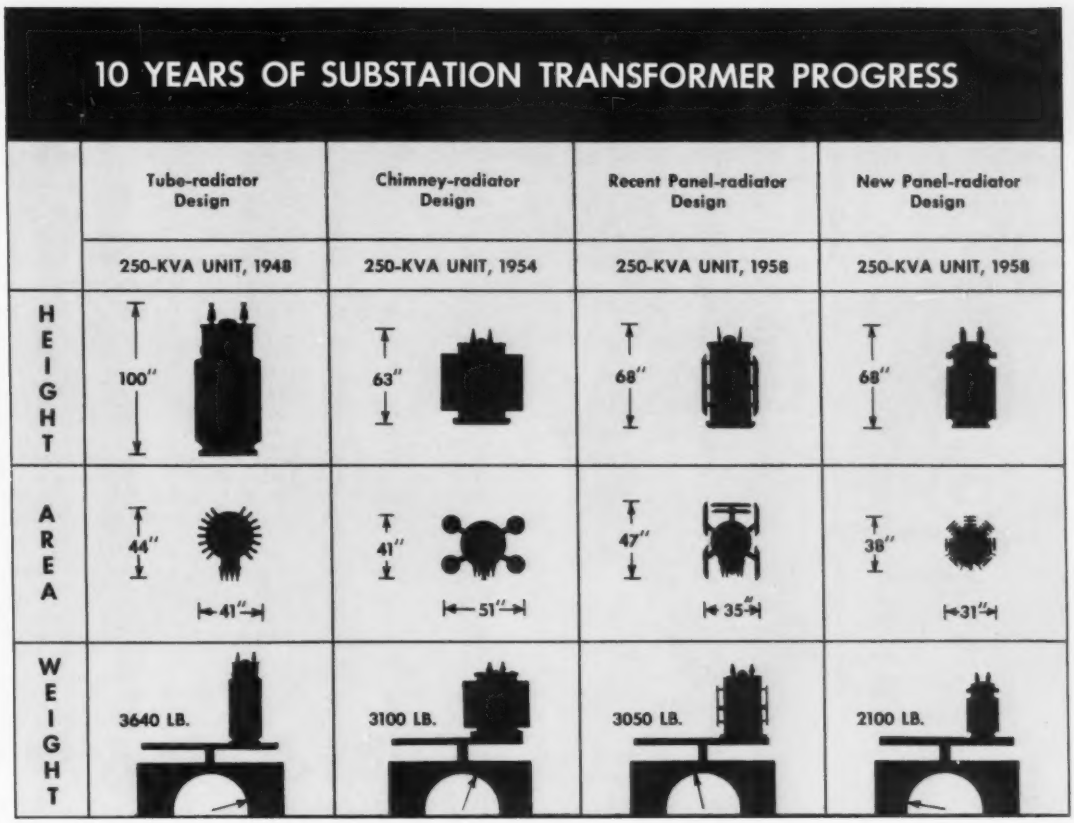
Significant reduction in size and weight and improved electrical characteristics stem from a newly designed interior and exterior. Formex* wire is now used exclusively for turn insulation. New panel radiators are only 8 inches wide.

The pad-mounted substation units incorporate the same basic design improvements as the Detroit Edison pole-type units. In addition, they are fitted with tank base, externally operated tap changer, thermometer and liquid level gage. The new units conform to EEI-NEMA standards, and are available in ratings 500 kva and below, 15 kv and below.

*Registered Tradename of G.E. Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC



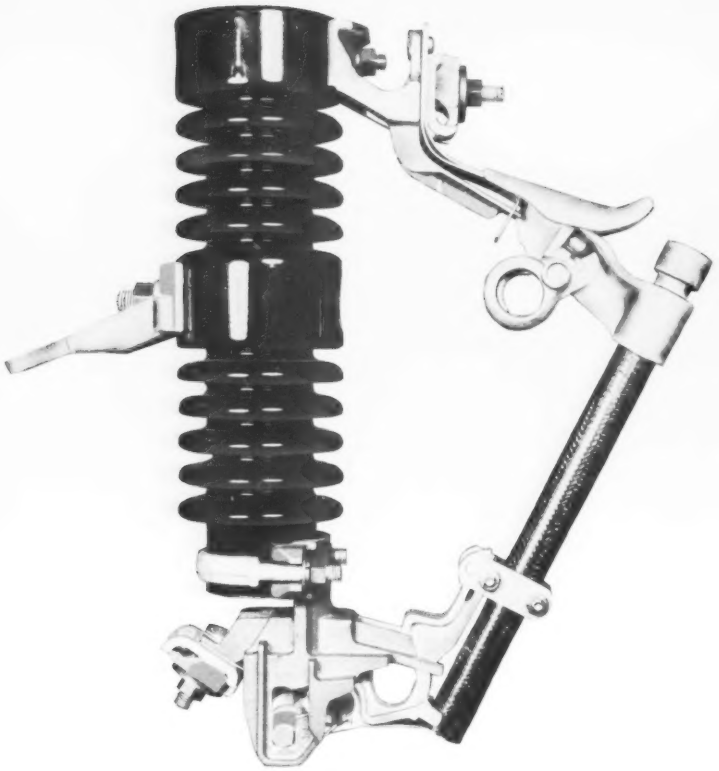
Detroit Edison and G-E engineers develop 250-kva pole-type transformer—paving way for new substation design

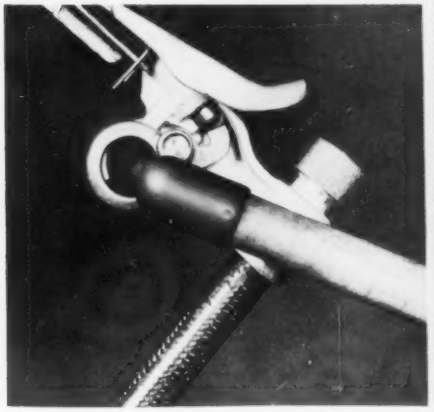
EDWARD G. ZIEGELER, Division Planning Engineer, Detroit Edison Company, reports on the 250-kva pole-mounted transformer whose features have been adapted for substation transformer use.

"The new 250-kva single-phase pole-type transformer helps us minimize congestion at transformer locations. Where lighting demand is in excess of 167 kva, we install one transformer, instead of two in parallel. In serving large secondary customers where the demand exceeds 500 kva we can install three 250-kva transformers. This eliminates the need for a second transformer cluster which is very often objectionable from a public relations standpoint, and usually difficult where space is at a premium."

For complete information, contact your General Electric Sales Office, or write to General Electric Co., Section 431-83, Schenectady 5, N. Y.

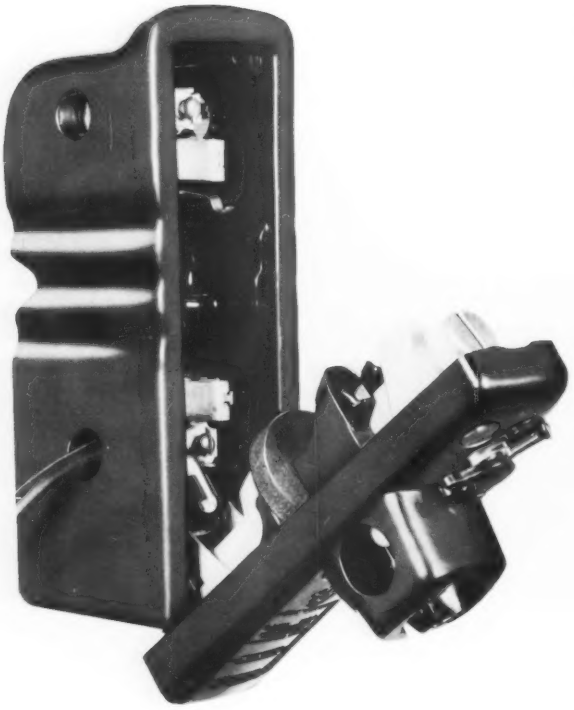
MR. L. H. LANDRY, left, Electrical Apparatus Div. of Detroit Edison Company, and P. J. Robinson, General Electric Utility Sales, inspect first pole-mounted 250-kva unit delivered to Detroit Edison Company. New substation transformer design resulted from developmental work done on this pole-type unit.





1 **ALWAYS READY** and unaffected by weather conditions, a conventional switchstick is all that's required to "break load."

Full-load switching



Revolutionary gas load-break on open and enclosed cutouts blows out arc automatically

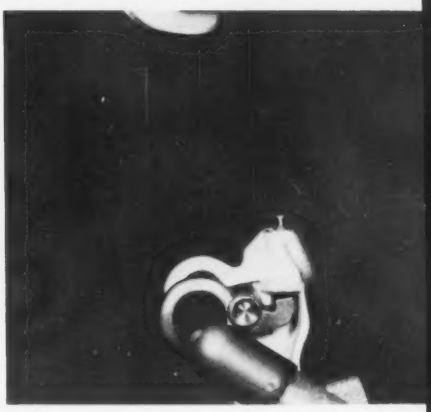
Now you can open circuits under full-rated load safely and economically with General Electric's new gas-operated load break. The gas load-break feature, first incorporated and proved in service on the G-E 100-ampere enclosed cutout is now available on all 7.8 and 15 kv ratings of G.E.'s open dropout cutouts including the disconnect blade.

Open or enclosed, the General Electric gas-operated load break can provide dependable low cost switching service over the entire distribution system. In addition, the lineman has complete control of the load break operation making opening under full load safer, easier and quicker. Existing G-E open type cutouts now in service can be converted to provide low cost switching. The fuse tubes for incorporating the new gas-load break feature are interchangeable with all G-E open-type cutouts of modern design. As part of the complete line of open dropout units available, a mechanical load break is also offered. Be sure to get complete details from your General Electric Apparatus Sales Office or write for bulletins GEA-1816 (open dropout cutouts) or GEA-6208 (enclosed units).

GENERAL ELECTRIC

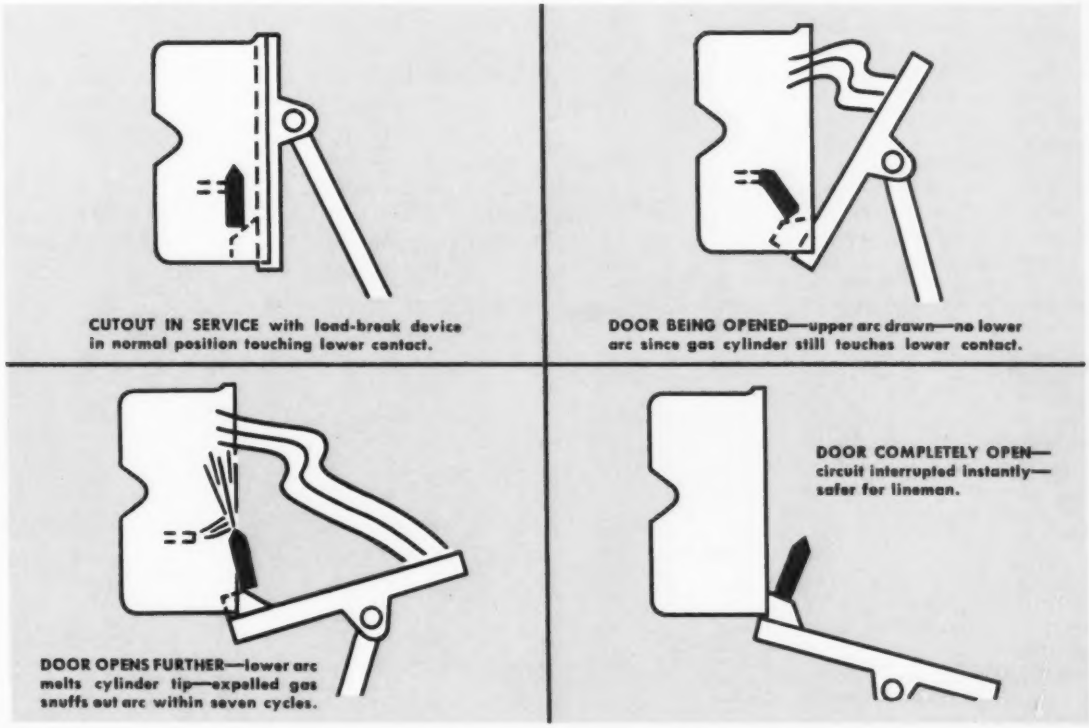
2 **ARC IS DRAWN** between top contact and tip of monel gas cylinder. Load break has no effect on normal cutout function.

3 **ARC MELTS TIP** of the monel gas cylinder releasing blast of insulating gas. This new device makes opening under full load safer and easier for your lineman.



4 **ARC IS OUT** within 2 cycles at full load. Circuit now open. Fuseholder can be removed; cylinder replaced in seconds.

with new G-E cutouts


CUTOUT IN SERVICE with load-break device in normal position touching lower contact.
DOOR BEING OPENED—upper arc drawn—no lower arc since gas cylinder still touches lower contact.
DOOR OPENS FURTHER—lower arc melts cylinder tip—expelled gas snuffs out arc within seven cycles.
DOOR COMPLETELY OPEN—circuit interrupted instantly—safer for lineman.

Implications of the New Network Finish

HAROLD BRUNTON, JR.
Manager—Network Transformer Sales

Paint is always a major concern on network transformers. When you put a unit in a vault that is periodically flooded or filled with contaminants washed off city streets, corrosion is an ever-present problem. Chemical snow removal practices aggravate the problem.

Faced with this situation, General Electric's first approach was to put some extra "gunk" on the bottom of the transformer. This part of the tank and radiators took the worst punishment. After considering plastic, rubber and tar materials, we decided on an asphalt-type "undercoat."

The application worked fine until we discovered that occasionally the "undercoat" would separate slightly from the transformer. Apparently this is an inherent problem of such "undercoats." And when it happens, the "undercoat" acts like a boot.

Water running down the side of the tank collects in the boot which, instead of protecting the tank, then aggravates the corrosion problem.

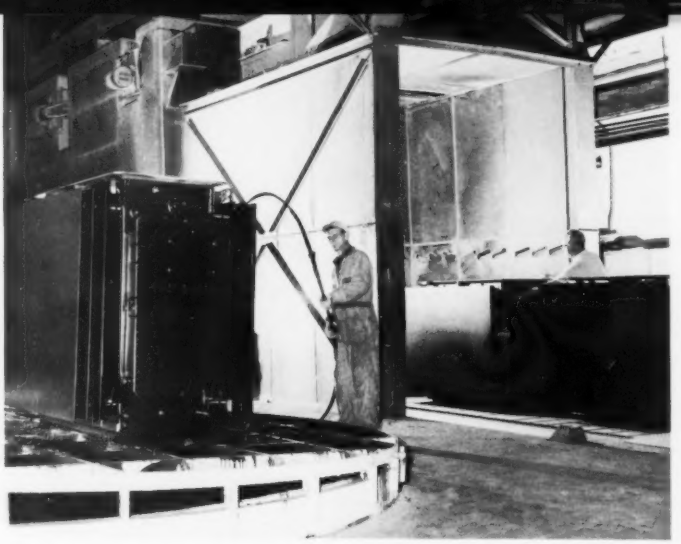
About this time, our laboratory came up with a new rubber-like paint called Melaprene which is applied to the tank surfaces. Results are almost unbelievable. In the "Weather-ometer" test, Melaprene lasts 6 times as long as our previous finish. In the standard ASTM accelerated salt-spray test,* Melaprene lasts more than 7000 hours compared to 1600 hours for the previous good finish.

We decided to apply this new paint as an extra protection on top of the previous finish. We painted the entire unit and used two coats instead of one. In 1957 we standardized the new paint system.

Subsequent experience revealed that Melaprene would discolor if left in sunlight. While the corrosion resistance was unimpaired, the appearance became unsightly with splotches of purple, yellow and brown. Our laboratory then developed a new Melaprene formulation which we "sandwich" between the base paint and an improved subway black, giving a finish which won't discolor in sunlight.

A few months ago, we started supplying transformers with the new paint finish. We believe that it is the best network transformer finish available today. Certainly we know it is far superior to anything G.E. has been able to offer. We believe it is a tangible ***extra value***.

*No. B-117-54T



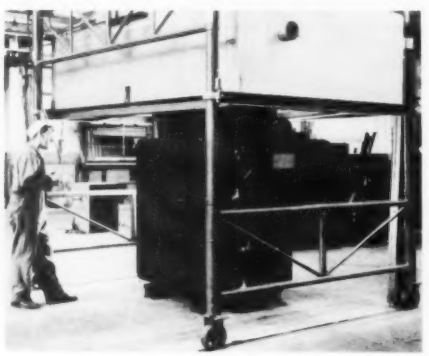
FLOW-PAINTING OF NETWORK TRANSFORMERS gives even coverage. The new conveyorized oven exactly controls the baking cycle.

New "Sandwich" Paint Process Applied To Network Transformers

The new G-E Vaultmaster network transformers are painted according to a new improved method. Instead of applying the finish coats directly over a base paint, the common practice, we sandwich Melaprene paint between the base and finish coats. This new six-step process gives longer finish life and improved resistance to sunlight.

Step 1—Carefully controlled grit shot blast
Step 2—Base coat of red lead-chromate—Flowed-on and baked
Step 3—***Two coats Melaprene paint—flowed-on and baked***
Step 4—Two coats Subway Black paint—flowed-on and baked
Step 5—Complete finish on tank rim—same as Steps 2 through 4
Step 6—Touch-up—sprayed-on and air-dried.

As noted in Step 5, the superlative five-coat finish is applied on the tank rim to which the cover is welded. Rather than just use touch-up paint over the welded area, G.E. has built an adjustable infra-red oven which enables each coat of paint to be individually baked on.



Adjustable Overhead Oven permits baking individual coats of paint on cover and tank rim after cover is welded to the tank.

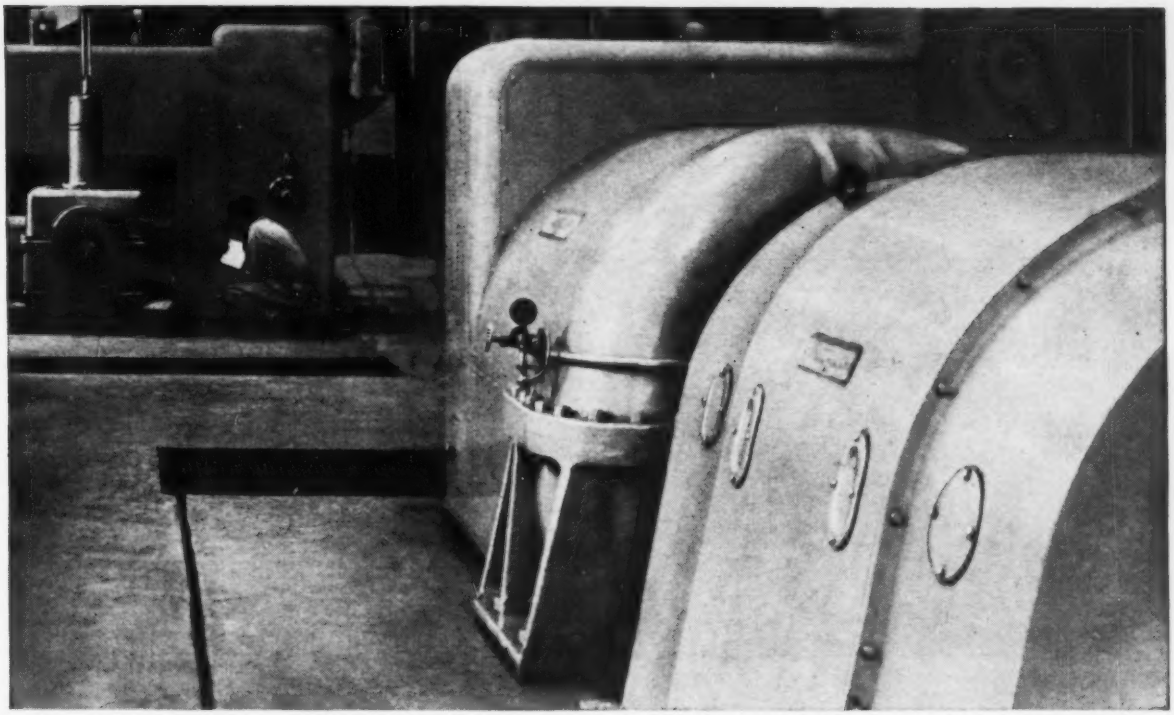
GENERAL ELECTRIC

STANDARD ENGINEER'S FIELD REPORT

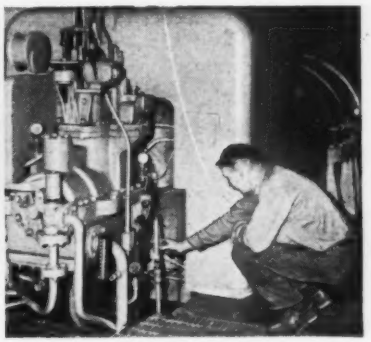
PRODUCT CHEVRON OC TURBINE OIL

FIRM Southern Utah Power Co. Cedar City, Utah

After 70,918 hours, Oil Neutralization No. only .01!

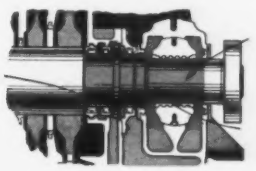


Latest analysis of Chevron OC Turbine Oil in these two Westinghouse steam turbines at Southern Utah Power Co. shows oil to be in virtually new condition. Neutralization number was just .01, and all other characteristics measured were equally satisfactory. At time of sampling, 2,500 KW turbine (in foreground) had run 70,918 hours, 5,000 KW unit (at rear) 31,670 hours. Neither unit has required sweetening since initial charge of Chevron OC Turbine Oil (formerly called Calol OC Turbine Oil).



Steam Plant Superintendent Ralph Jones (left) explains how changes in load automatically control boiler's induced draft fan through this fluid coupling. Chevron OC Turbine Oil has given excellent service as hydraulic fluid in this coupling. At right, Mr. Jones checks oil temperature on smaller turbine. This unit went into service in 1945, the larger one in 1951.

Why Chevron OC Turbine Oil prevents sludging, rusting and wear



- Excellent metal wetting ability keeps oil on bearings and gears under heaviest loads
- Oxidation inhibitor prevents sludge, gum and lacquer formations
- Corrosion inhibitor prevents rusting

For More Information contact your Standard Engineer or Representative, or write 225 Bush Street, San Francisco 20, California

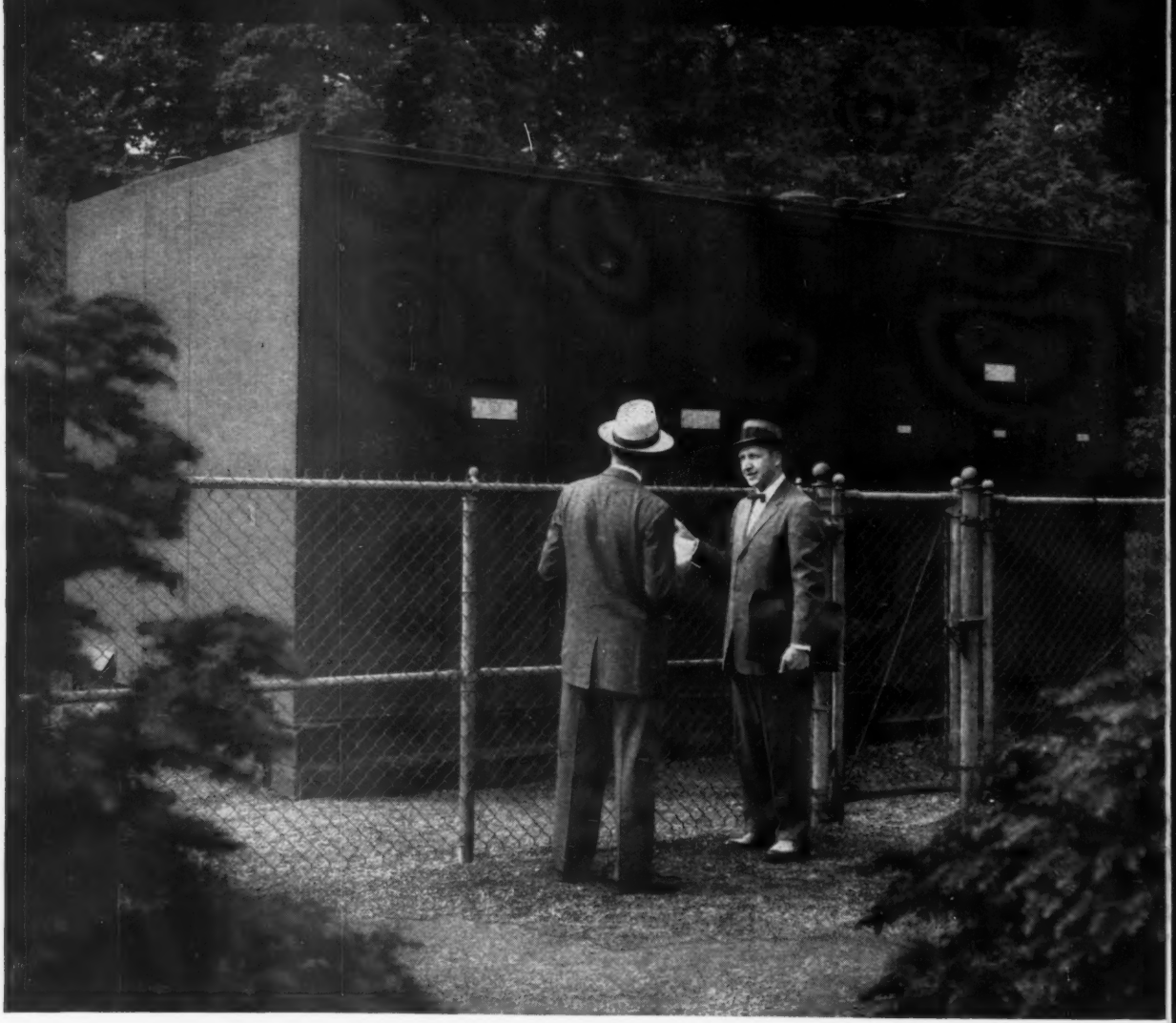
CHEVRON

TRADEMARKS "CHEVRON" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA

CSP integral primary unit substations . . .
coordinated, assembled and tested by Westinghouse . . .

SINGLE ENGINEERING PURCHASING . . . SINGLE-RELOCATION WHEN



RESPONSIBILITY SIMPLIFIES UNIT FLEXIBILITY PERMITS LOADS SHIFT

Completely self-protecting and self-contained, the Westinghouse CSP® unit substation is ready to install. No special engineering is necessary; Westinghouse has already coordinated, assembled and tested all component parts . . . Here is a complete package that streamlines and simplifies your purchasing — with undivided responsibility for meeting your every requirement.

These units offer excellent economical advantages for loads of moderate to high load density, particularly where the load is expected to shift in the future. Installation is rapid and economical, the single unit requiring but a single pad; no interconnection and coordination of components.

Single-unit flexibility eases relocation problems, too. The complete substation can be disconnected, moved to the new site and reconnected.

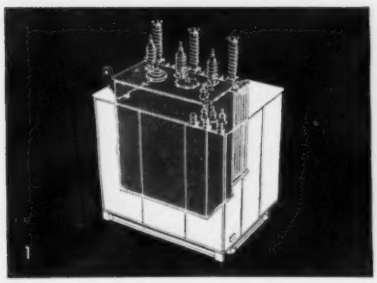
A contoured unit is available for residential areas; with all equipment enclosed in a steel cabinet, high- and low-voltage leads enter through the bottom, and overhead structures are eliminated.

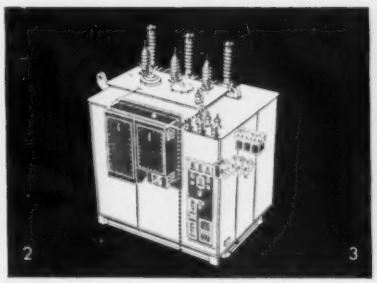
The Westinghouse CSP unit substation is a prime example of how PLOWBACK OF EARNINGS into vast engineering facilities is helping to solve your everyday electrical distribution problems — now, and for the future. For the complete story of its advantages, call your Westinghouse representative; or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

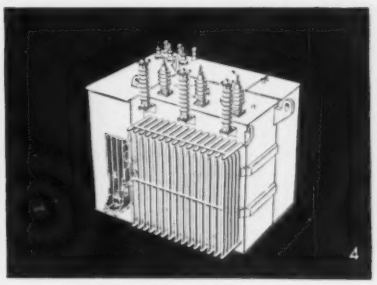
J-70878

YOU CAN BE SURE...IF IT'S

Westinghouse



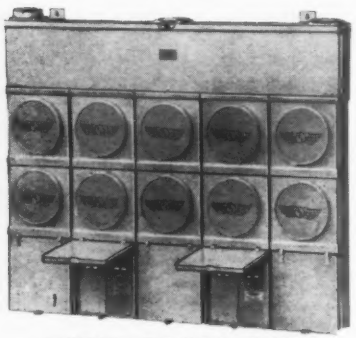




CSP unit consists of (1) completely sealed coreform transformer — all gauges, valves and protective devices contained within the substation housing; (2) load tap changer — accurate, automatic voltage regulation; (3) metering instruments and controls; and (4) De-ion® circuit breaker, which fully protects against circuit and overload damage.

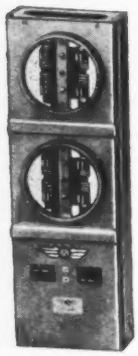
Mr. Terry W. States, Westinghouse representative, explains the flexibility advantage of the contoured Westinghouse CSP unit substation.

THE LINE WITH THE GOLDEN TOUCH



RAINTIGHT TWO HIGH TEN METERS

APARTMENT HOUSE METER AND BREAKER ASSEMBLIES



INDOOR TWO HIGH METER-BREAKER ENCLOSURE

Designed for every need of the Electrical Contractor

For the first time:

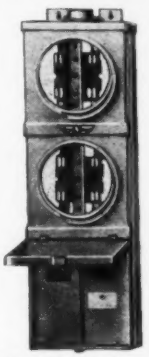
Raintight and Indoor Construction
Unlimited Number of Meter Enclosures and Service Wireway in One Assembly
1, 2, 3, and 4 High Meter Enclosures
15 Amp to 100 Amp Breakers
100 to 800 Amp Wireway Service

Immediate Delivery. Devices may be purchased gangable, in separate units or Factory Assembled and Pre-Wired with breakers included.

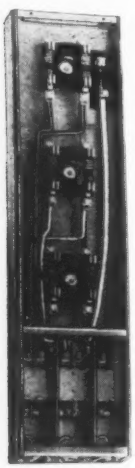
Special Constructions for Unusual Area Demands.

We are showing just a portion of our Apartment House line. Catalog sent on request.

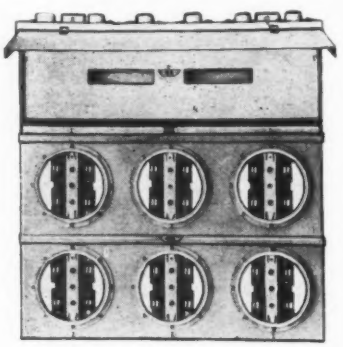
INDOOR ONE HIGH METER-BREAKER ENCLOSURE



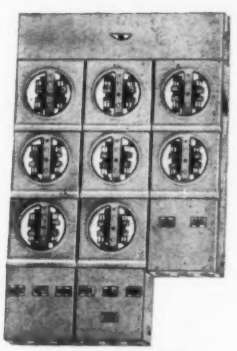
RAINTIGHT TWO HIGH METER-BREAKER ENCLOSURE



INDOOR THREE HIGH METER-BREAKER ENCLOSURE SHOWING WIRING



RAINTIGHT TWO HIGH SIX METERS SPECIAL CONSTRUCTION FOR HAWAII'S TROPICAL WEATHER



INDOOR THREE HIGH EIGHT METERS

Watch for opening of new offices in San Francisco, Portland, Phoenix, and Honolulu

BLAKEMAN ELECTRIC LOS ANGELES — BB — BROTHERS MFG. CO. INC. CALIFORNIA

Contact Your Jobber
Meter Mounting Devices • That's All

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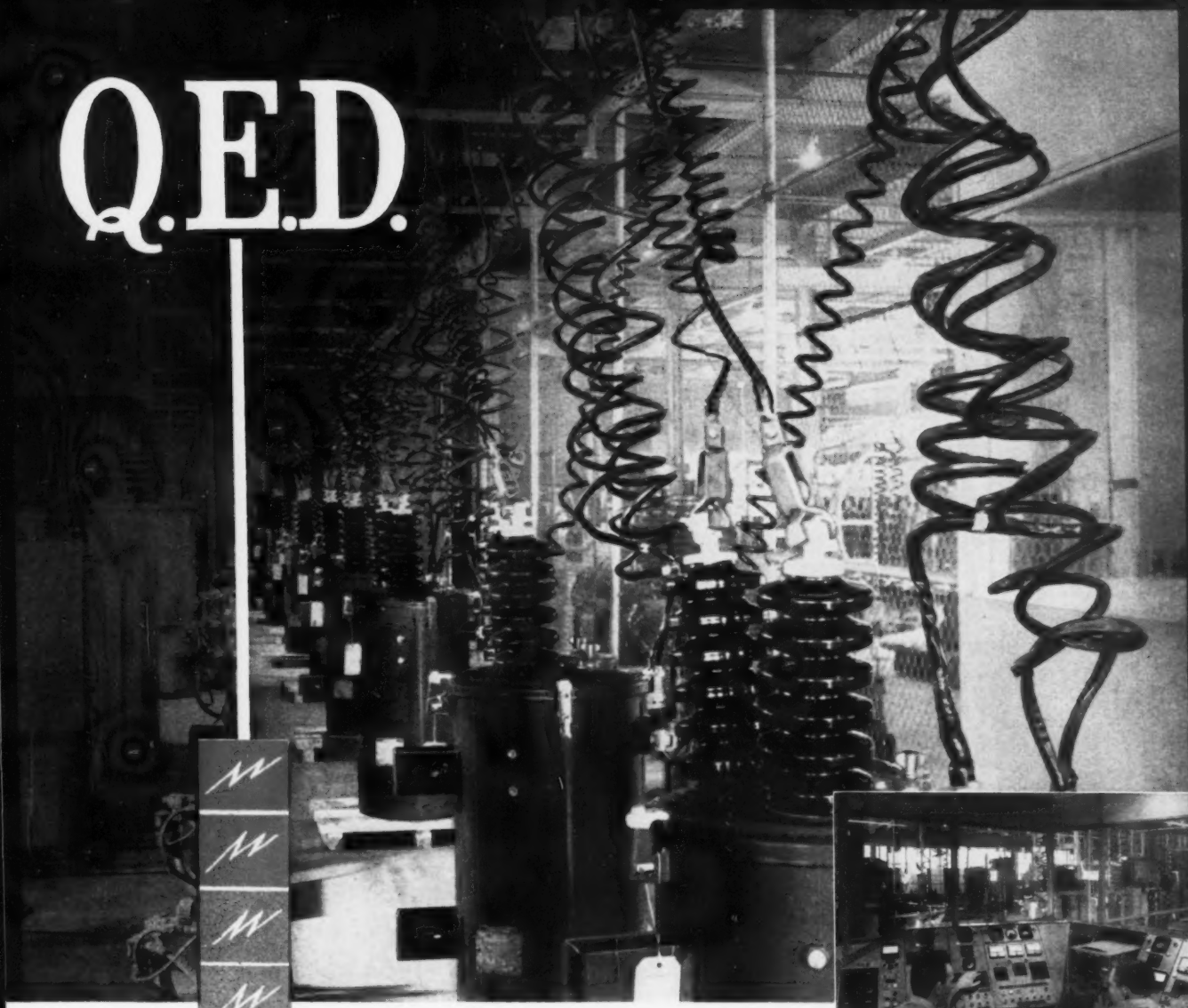


Copper Loss Test

Ratio Test

Impulse Test

Induced Potential Test

Applied Potential Test

Core Loss Test

Sound Test

CSP Breaker Test (when applicable)

Every Moloney Distribution Transformer is proven by rigorous, automatic testing.

After a transformer has passed through Moloney's automatic test area, the users can be assured that it will provide years of efficient, dependable service.

Each Moloney transformer must pass copper loss, ratio, impulse, induced potential, applied potential, core loss and sound level tests.

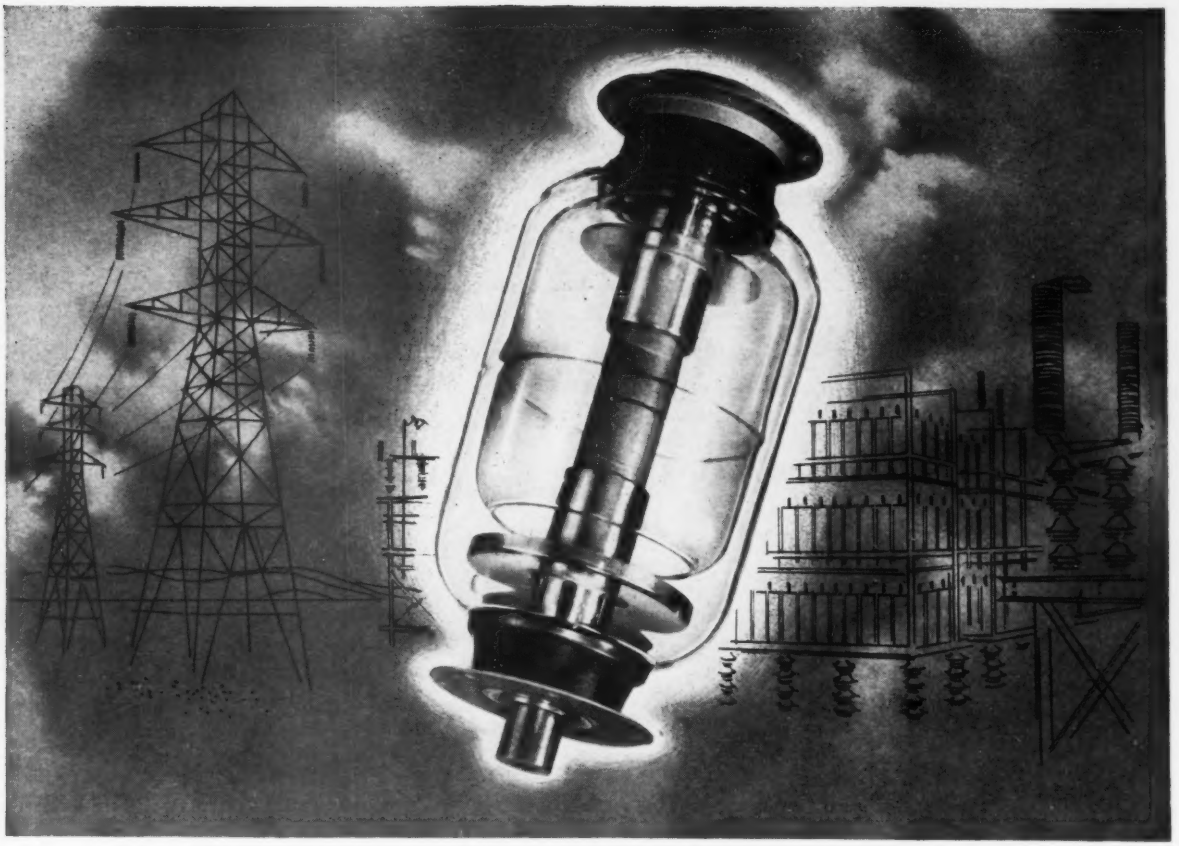
Take advantage of the modern design, manufacturing and testing procedures developed by Moloney. Specify Moloney Transformers . . . All Along the Line.

ME 58-26

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA



REVOLUTIONARY NEW POWER SWITCH

featuring... VACUUM!

The success or failure of any power switch depends on the strength and all-around efficiency of its dielectric. Over 17 years of research and development by Jennings Radio Manufacturing Corporation plus hundreds of installations in the power field prove that a vacuum has no rival as an interrupting medium. Here are the reasons:

A vacuum dielectric is 30 times stronger than air. In fact, contact openings of only 1/32 inch will hold off over 100,000 volts because practically no molecules remain to be ionized.

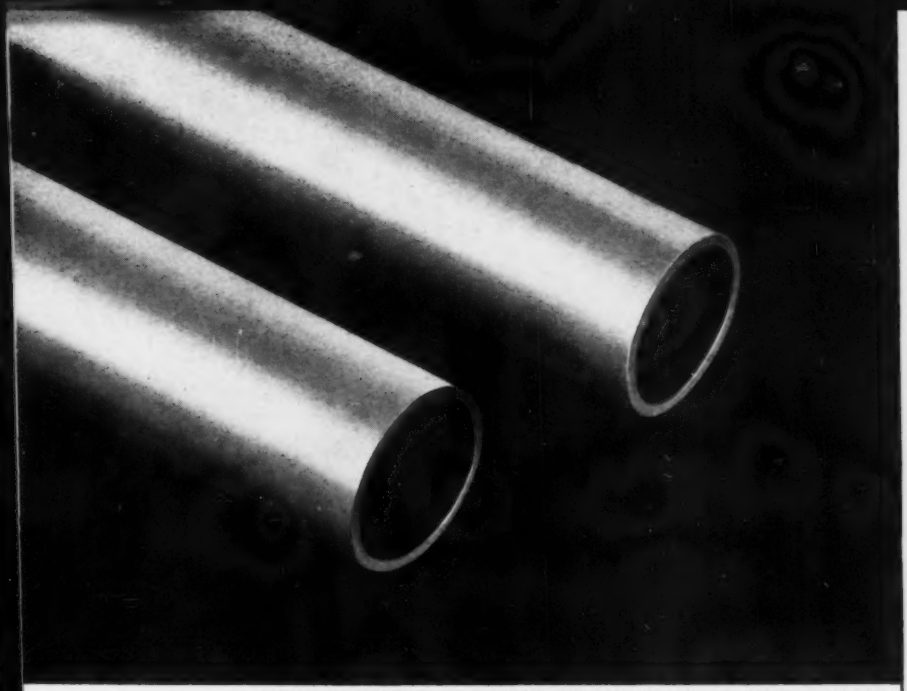
A vacuum dielectric is also characterized by extremely rapid recovery in dielectric strength because the vaporized contact material which carries the current diffuses very rapidly into the surrounding vacuum. Therefore, 60 cycle power circuits are always interrupted at the first current zero.

These facts have been recognized for years but now Jennings has developed unique processing methods that make a vacuum dielectric practical in power switches. These techniques insure a stable vacuum wherein contacts and vacuum seals will not break down even though subjected to enormous abuse over a long period of time.

Unusually long contact and vacuum life is assured by these cleaning and outgassing techniques. Low energy arcs reduce erosion of contacts and vacuum actually improves with repeated current interruption. This incredibly clean vacuum also permits the use of contacts made of refractory metals with high resistance to welding.

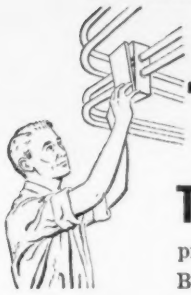
Vacuum switch installations for capacitor switching, line dropping, load break, and circuit breaker applications are now being made by switchgear manufacturers using Jennings' vacuum switch contacts. We have prepared literature describing the ten sizes now available for power use. Send for your copy.

Jennings® RADIO MANUFACTURING CORP. • 970 McLaughlin Ave., P. O. Box 1278 • San Jose 8, Calif.



Hard galvanized finish for durability; polished satin lustre for lasting good looks.

Even EMT can look good ...if it's CIRTUBE* EMT



TRUE, the first things you look for in EMT are: one, is it easy to work with—two, is it made to give lasting protection. CIRTUBE EMT, by the way, rates tops on both. But there's no reason why EMT can't *look* good as well!

That's where CIRTUBE EMT "shines," too. Reason for its pleasing polished satin lustre is the cyanide zinc plating process Circle uses (even though it costs a little more to apply than other methods).

The zinc bond is better, too—won't chip or flake off. That's because Circle employs elaborate cleaning processes to make sure that the steel is absolutely clean before plating.

Quality finish is only one of many reasons why CIRTUBE EMT has gained such wide acceptance in so short a time. Why not try it next time you order—you'll like it.

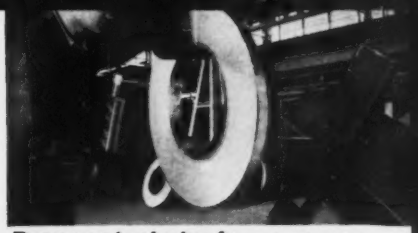
*Trade Mark

CIRCLE WIRE & CABLE
a subsidiary of
CERRO DE PASCO CORPORATION

PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** In all principal cities

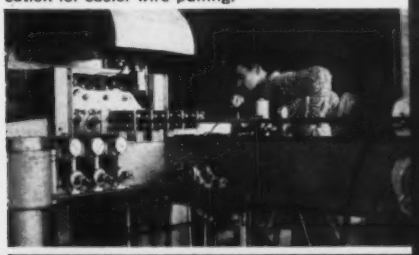
RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

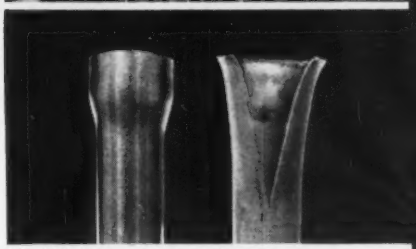
CIRTUBE EMT *Ask for it!*



Proper steel plus! The best cold rolled steel plus the right handling give CIRTUBE EMT its natural bendability.

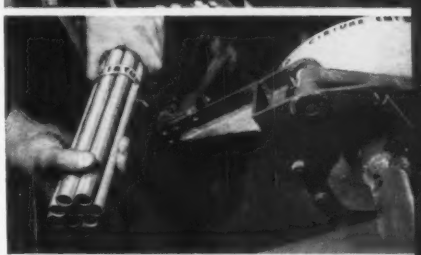
Easy fishing! A baked-on protective coating gives CIRTUBE EMT a built in lubrication for easier wire pulling.





Split-free, bead-free! Induction welded CIRTUBE EMT, left, proves stronger than ordinary EMT, provides easier fishing.

Automated quality control! Automatic controls assure complete and continuing uniform quality of product.



Tight, easily handled bundles! Bright, orange tapes hold CIRTUBE EMT securely for easy handling on and off the job.

Fast, friendly service! Well-known Circle service through a nation-wide network of well stocked nearby warehouses.

THE INDUSTRY'S FIRST *single-vent*

THE HUBBARD EHD

THE HUBBARD EHD Cutout is one of the first products to be designed, developed and perfected in the new, completely integrated Hubbard Electrical Research Laboratory. It is here that the single-vent, small-bore operation in the extra heavy duty range—long acclaimed as the most desirable but thought impossible—has now been achieved and thoroughly and conclusively tested.

THIS EMBLEM —symbolic of the Hubbard EHD, the industry's first Single-Vent, Small-Bore Cutout—is your assurance of *positive and safe* protection against all fault currents from a minor overload to the maximum rating of the EHD Cutout.

SINGLE VENT
EHD
SMALL BORE

HUBBARD EHD
Open Dropout Cutout
Rated—100 amperes continuous current
10,000 amperes at 5.2 kv and 7.8 kv
8,000 amperes at 15 kv

small-bore extra heavy duty cutout

WHAT DOES SINGLE-VENT SMALL-BORE MEAN TO YOU?

The confinement offered by a single-vent, small-bore fuse tube is well recognized as the most efficient condition for fault current interruption. As applied to the Hubbard EHD Cutout it offers:

POSITIVE PROTECTION throughout the *full range* of fault currents from small overloads to high short circuit currents —without "null operating points." This safe and positive fault current interruption prevents unnecessary service outages.

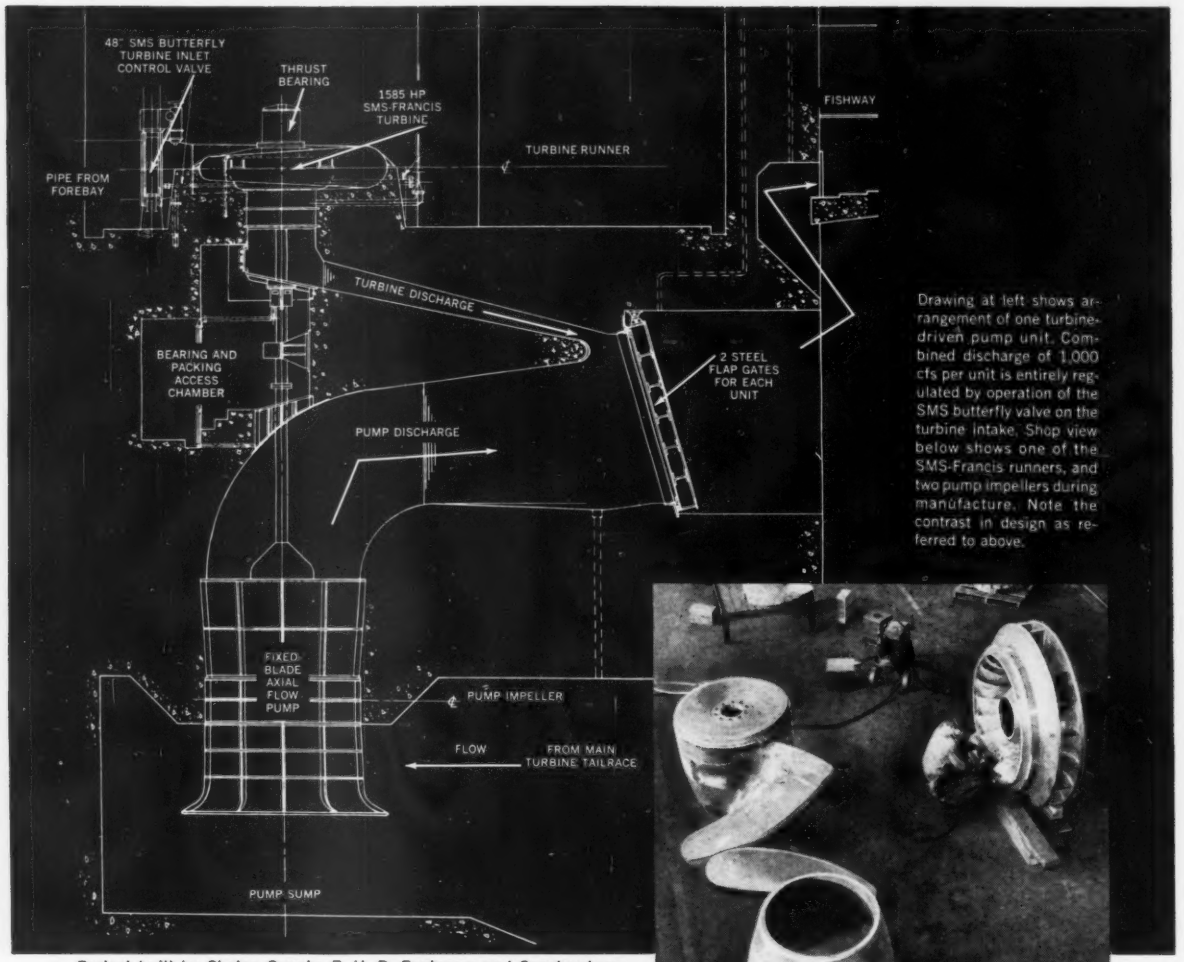
SAFE OPERATION—the unique recoil design, used in the Hubbard EHD, absorbs the jet-action thrust of Single-Vent operation. A single exhaust envelope is discharged in a small confined cone, contributing to increased safety for personnel and equipment.

Ask your Hubbard representative to show you complete test results, including ultra high speed movies which stop the action of an EHD Cutout clearing an 8000 amp fault current.

HUBBARD

AND COMPANY · 200 South Michigan Avenue · Chicago 4, Illinois

Manufactured in Canada by N. Slater Company, Limited • Hamilton, Ontario



Drawing at left shows arrangement of one turbine-driven pump unit. Combined discharge of 1,000 cfs per unit is entirely regulated by operation of the SMS butterfly valve on the turbine intake. Shop view below shows one of the SMS-Francis runners, and two pump impellers during manufacture. Note the contrast in design as referred to above.

Project built by Chelan County, P. U. D. Engineers and Constructors: Stone & Webster Engineering Corp., Wenatchee, Washington

SMS Turbine-Driven Pumps Used in Rocky Reach Fishway

In addition to the seven 140,000 HP SMS-Kaplan turbines that will harness the Columbia River at Rocky Reach Hydroelectric Project, three special SMS turbine-driven pump units will provide water for the fishway system. These are SMS-Francis turbines, with a 48-inch SMS butterfly valve on the spiral case inlet. A fixed-blade, axial flow pump is directly coupled to the turbine. Two semi-buoyant structural steel flap gates prevent reverse flow from the fishway.

An interesting contrast is present in this arrangement, in that a very low specific speed turbine runner (normally used for 800 to 1000 foot heads) operating under 60 to 90 foot head is used to match the speed and drive a very high specific speed pump impeller, designed for pumping a 4 to 5 foot, pool to pool head. This simplified arrangement eliminates the multiplicity of conversion losses inherent with a motor drive and results in increased overall efficiency and simplification of controls.

Current bulletins describing SMS hydraulic turbines, pumps and accessory equipment, as used in the above installation, are:

#152 – Francis Turbines • **#163** – SMS Water Control Gates • **#164** – Complete Valve and Remote Control System • **#165** – Adjustable and Fixed Blade High Capacity Axial Flow Pumps

Write S. Morgan Smith Company, York, Pennsylvania for further information.

More Power To . . . LIVE BETTER ELECTRICALLY

S. MORGAN SMITH

HYDRODYNAMICS

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

Rotovalves • Ball Valves • R-S Butterfly Valves • Free-Discharge Valves • Liquid Heaters • Pumps • Hydraulic Turbines & Accessories

TWO IMPORTANT NEW FACTS ABOUT KAISER ALUMINUM AAAC

1. AAAC now available on an unlimited basis!

In the three years since Kaiser Aluminum first introduced AAAC, this revolutionary new all aluminum alloy conductor has been offered on a limited basis so that we could keep accurate records of its performance.

During this time, over two million pounds of Kaiser Aluminum AAAC—installed in widely varying locations—have been thoroughly tested and job proved. Results of these 3-year tests prove conclusively that AAAC offers remarkable new advantages in performance, economy and corrosion resistance.

These results have *far exceeded* our most optimistic expectations and we are now ready to offer AAAC for unlimited general use.

2. AAAC accessories now available from leading accessories manufacturers!

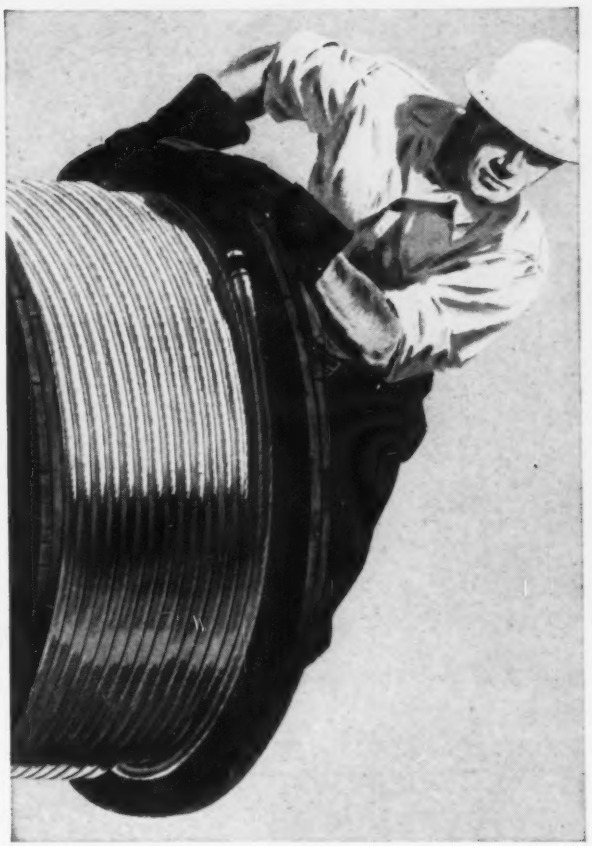
Leading manufacturers of armor rods, automatic splices and compression joints have recently established a full range of availabilities for these accessories. You'll find them listed and priced in published catalogs.

Many of these accessories have been tested on the same installations used by Kaiser Aluminum for proving AAAC. These tests have resulted in simplified installation techniques for miles of installed lines.

Your present KW distributor is a dependable source of top quality AAAC accessories.

KAISER ALUMINUM

IF IT CARRIES CURRENT, KW CARRIES IT!



SEND FOR FREE AAAC BOOKLET

Yours for the asking...all the facts about new Kaiser Aluminum AAAC, complete with engineering data and ordering information, wrapped up in a concise, informative booklet. Get your copy now by mailing in the handy coupon below.

PLEASE SEND YOUR FREE BOOKLET CONTAINING FULL DETAILS ABOUT AAAC

Kaiser Aluminum & Chemical Sales, Inc.
Dept. 952
919 N. Michigan Avenue, Chicago 11, Ill.

Please send your free booklet containing full details about AAAC.

Name_____

Address_____

City_____ State_____

E. WE.

EXTRA VALUES

1

FORM 406
FLUORESCENT LUMINAIRE

INTERNAL FAN COOLING

- Air-circulation system—a G-E exclusive—boosts light output of luminaire up to 25%.
- Four Power Groove lamps generate 37,200 lumens.
- No increase in unit cost.
- Completely factory-assembled and tested; shipped in ***single*** carton.
- Ideal for business streets, traffic arteries, expressways, interchanges, parking lots, shopping centers.

2

"TEE-LIGHTING"
FLUORESCENT SYSTEM

NEW STREET-LIGHTING CONCEPT

- Ideal for "prestige" lighting of business whiteways.
- Highest utilization efficiency of any fluorescent system.
- Greater driver comfort.
- Uni-directional reflectors in parallel units aim light across street.
- Parallel fluorescent units, 18,600 lumens each; transverse unit, 18,600 to 55,800 lumens.

3

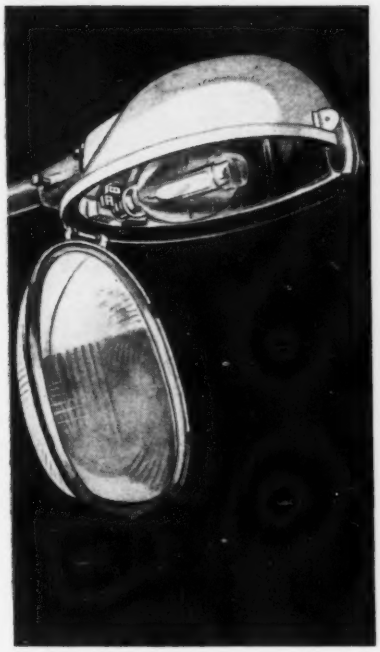
"POWER PACK"
MERCURY LUMINAIRE

NEW BUILT-IN BALLAST

- Only two terminal connections—saves up to 30 minutes per unit installation.
- Eliminates need for ballast-adapters or transformer-base poles—saves $30 to $65 per pole.
- Same outstanding lighting efficiency you have experienced with the General Electric Form 400—best in the industry.
- Low ballast losses.

in Outdoor Lighting from General Electric

4

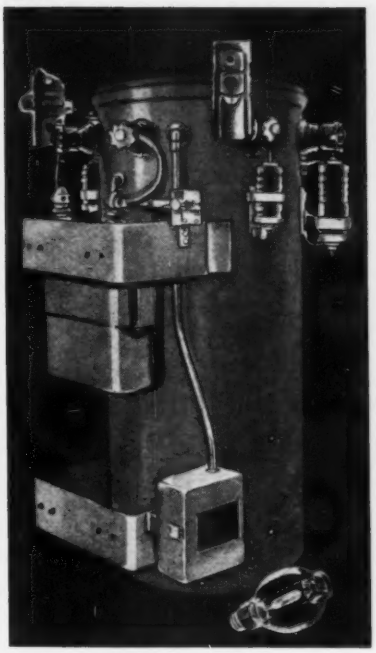


NEW FORM 400C MERCURY LUMINAIRE

ONE-PIECE REFLECTOR HOUSING

- New General Electric one-piece, anodized-aluminum reflector-housing.
- Lighter weight for easy installation and maintenance; larger volume for effective heat dissipation.
- Outstanding versatility; operates five lamps, provides four IES distribution types.
- With precision-molded glass refractor, provides unequalled photometric performance.

5



FOR 400-WATT SERIES APPLICATIONS

BALLASTLESS MERCURY SYSTEM

- New 400-watt mercury lamp with built-in cutout—***exclusive*** G-E development gives reliable operation.
- ***Packaged*** substation-type regulator —another G-E ***exclusive***, combines ***all*** control equipment in self-contained, pre-assembled package.
- Eliminates need for separate ballasts for series circuits.
- Reduces costs of installation, operation, and maintenance.

Check these EXTRA VALUES

for the complete story on General Electric's new Outdoor Lighting products

1. FORM 406 FLUORESCENT LUMINARE
2. "TEE-LIGHTING" FLUORESCENT SYSTEM
3. FORM 400 "POWER PACK" MERCURY LUMINAIRE
4. NEW FORM 400C MERCURY LUMINAIRE
5. BALLASTLESS MERCURY (SERIES CIRCUIT)

These five advanced-design lighting developments are headliners of more than a dozen new, redesigned products from General Electric. All are outstanding examples of General Electric product and research leadership. Each contains time- and money-saving features which mean EXTRA VALUE for you.

For full details, see your G-E Sales Engineer or Agent, or check the products you're interested in, fill out coupon and mail.

Section E450-4
General Electric Company
Schenectady 5, New York

Name_____

Company_____

Address_____

City_____ State_____

Progress Is Our Most Important Product

GE

GENERAL ELECTRIC

Keep your standing poles . . . standing *INDEFINITELY** *by cyclical inspection and ground-line treating*

Indefinitely is a long time. However, many years of practical experience by a number of Utility Companies proves that you can reliably extend the service life of your older standing poles for at least 10 years with one OSMOPLASTIC groundline application.

After ten years another inspection and OSMOPLASTIC treatment assures an additional ten years of trouble-free service. This cyclical type of program which is being carried out by many well-managed Utility Companies simply adds up to safe poles at *lowest per year cost.*

*** PROOF AFTER 10 YEARS**

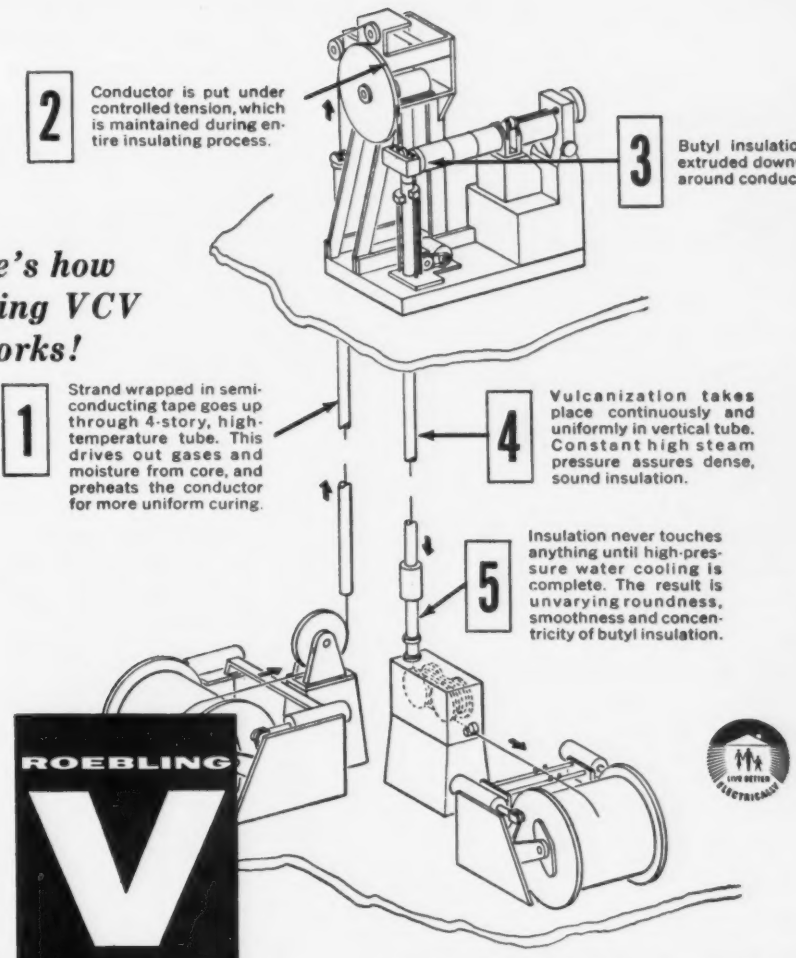
This pole was inspected and given Osmoplastic groundline treatment ten years ago. At that time decayed wood was removed. A few months ago this pole was re-inspected. It was perfectly sound and re-treated with Osmoplastic. PROOF that you can be assured of the savings which proper inspection and groundline treatment provide.

In 15 years we have treated over two million poles without one dissatisfied customer.

DAN KAMPHAUSEN CO.

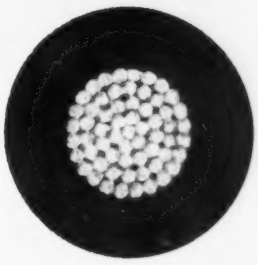
CONTINENTAL OIL BLDG., DENVER 2, COLORADO

Pole Inspectors & Treaters, Inc. **Pole Sprayers, Inc.**


2
Conductor is put under controlled tension, which is maintained during entire insulating process.
3
Butyl insulation is extruded downward around conductor.
Here's how Roebling VCV works!
1
Strand wrapped in semi-conducting tape goes up through 4-story, high-temperature tube. This drives out gases and moisture from core, and preheats the conductor for more uniform curing.
4
Vulcanization takes place continuously and uniformly in vertical tube. Constant high steam pressure assures dense, sound insulation.
5
Insulation never touches anything until high-pressure water cooling is complete. The result is unvarying roundness, smoothness and concentricity of butyl insulation.

The Conductor is Always Dead Center

ROEBLING VCV



ROEBLING'S 15 KV CABLE HAS UNIFORMLY HIGH CORONA LEVEL AND DIELECTRIC STRENGTH. VERTICAL CONTINUOUS VULCANIZATION ASSURES UNUSUALLY LONG TROUBLE-FREE CABLE SERVICE.

If you sliced a length of Roebling's VCV 15 kv Cable into cross sections, you'd find that *every inch* is uniform, every inch is round, and in every inch the conductor is exactly centered!

VCV is responsible for the exceptional quality of this new high-voltage cable. No longer will you buy cables in which the conductor has "snaked," or that has flattened, scraped, blistered or abraided insulation. Because insulation is the same thickness and density for the length of the cable, dielectric strength and corona level are uniformly high.

ROEBLING VCV 15 kv CABLES are available in a complete range of conductor sizes and insulation thicknesses

Write today for more facts about the longer, better service you'll get with Roebling VCV High-Voltage Cable. Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

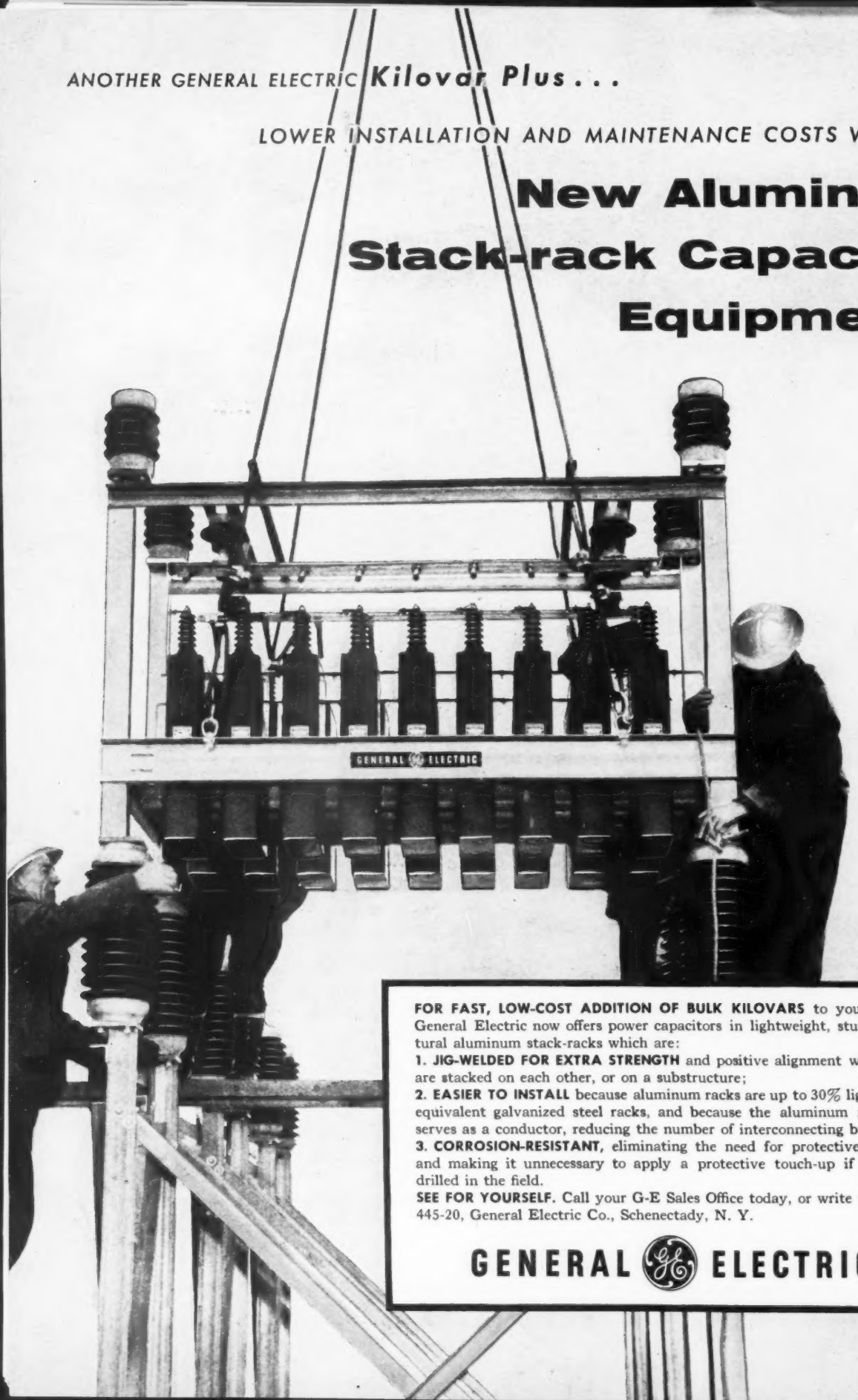
ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

ANOTHER GENERAL ELECTRIC **Kilovar Plus . . .**

LOWER INSTALLATION AND MAINTENANCE COSTS WITH . . .

New Aluminum Stack-rack Capacitor Equipments



FOR FAST, LOW-COST ADDITION OF BULK KILOVARS to your system, General Electric now offers power capacitors in lightweight, sturdy structural aluminum stack-racks which are:

1. **JIG-WELDED FOR EXTRA STRENGTH** and positive alignment when racks are stacked on each other, or on a substructure;
2. **EASIER TO INSTALL** because aluminum racks are up to 30% lighter than equivalent galvanized steel racks, and because the aluminum rack itself serves as a conductor, reducing the number of interconnecting busses;
3. **CORROSION-RESISTANT,** eliminating the need for protective painting, and making it unnecessary to apply a protective touch-up if racks are drilled in the field.

SEE FOR YOURSELF. Call your G-E Sales Office today, or write to Section 445-20, General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

Positive Protection Against Phase Failure and Phase Reversal ?

Here is your answer!

The Allen-Bradley Bulletin 812 Type F, Type R, and Type RF relays provide positive protection against the hazards to men, motors, and driven machinery, resulting from phase failure and/or phase reversals.

The Bulletin 812 Style F phase failure relay employs a unique static sensing network that responds to all open phase conditions on a motor branch circuit and immediately removes the motor from the line . . . irrespective of the load on the motor (including no load), or the circuit arrangement. This relay even responds to hard-to-detect primary failures on a wye-delta transformer with ungrounded neutral. Furthermore, the five-cycle response prevents nuisance "drop-outs" from transient fluctuations.

The Bulletin 812 Style R phase reversal relay disconnects the motor from the line—whether it is running or not—when a phase reversal occurs anywhere in the system on the line side of the relay. Thus, it can be employed for a single motor, a group of motors, or an entire power system. In addition, the phase reversal relay prevents the motor from starting should phase failure occur while at a standstill—a vital feature for elevator applications.

The Bulletin 812 Style RF relay combines the elements of Style R and Style F relays for protection against both phase failure and phase reversal. All Bulletin 812 relays are inherently "fail safe." Send for complete information.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd.
Galt, Ont.

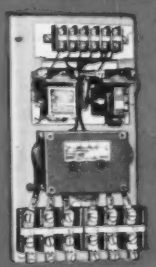
ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

12-58-MR

Bulletin 812, Style RF for Phase Failure *and* Phase Reversal

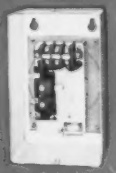
INDIVIDUAL RELAY UNITS AVAILABLE

For Phase Failure

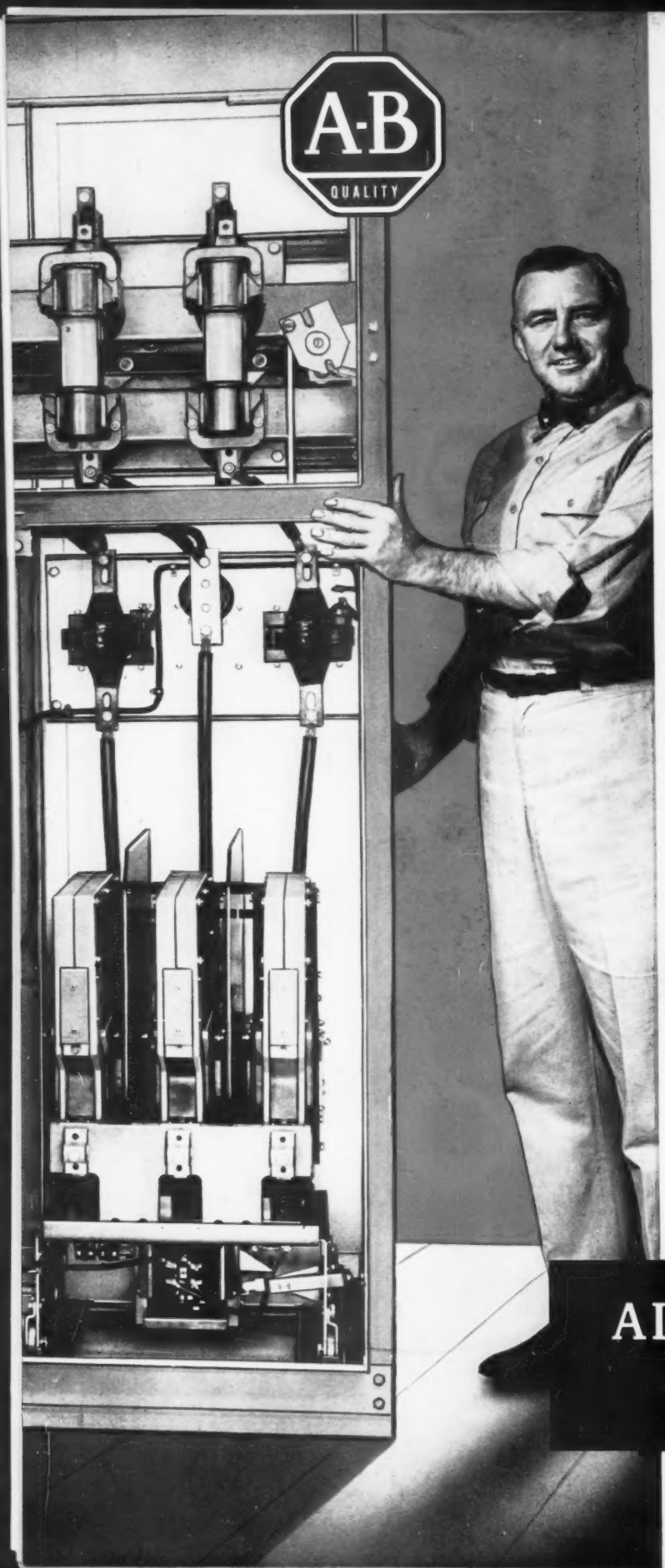


Style F covers full load currents from 1.5 to 300 amp in 4 sizes. Coils for up to 600 v, 60 cycles.

For Phase Reversal



Style R made with coils for 110, 208/220, 440, 550 v for either 50 or 60 cycle operation.

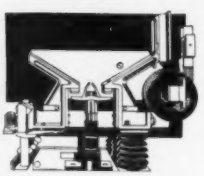


Tough high-voltage job?...Here's the answer!

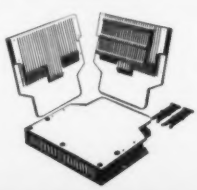
Allen-Bradley High-Voltage Air Break Starters are ideal for frequent switching, reversing, plugging, or jogging.

A tremendous operating life has been built into these high-voltage air break starters . . . resulting from the use of the simple solenoid contactor. It's the same design—having only ONE moving part—that provides millions of trouble free operations in Allen-Bradley's low-voltage controls. These starters are made in a complete line for all types of service. Send for Publication 6080, today.

ONLY ONE MOVING PART
With this simple solenoid design, all trouble causing pivots, pins, and flexible jumpers are eliminated. Straight up-and-down motion of contactor is virtually frictionless.



DOUBLE BREAK CONTACTS
Allen-Bradley silver alloy contacts never need maintenance . . . they remain in perfect operating condition until completely worn away. Vertical motion assures uniform contact pressures at all times.



FASTER ARC SUPPRESSION
The air break contactor employs a completely different blowout design and novel arc chute which assure rapid arc extinction. Chutes are molded from arc resistant material.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.
12-58-M

Shopping for hardware . . . or protection?

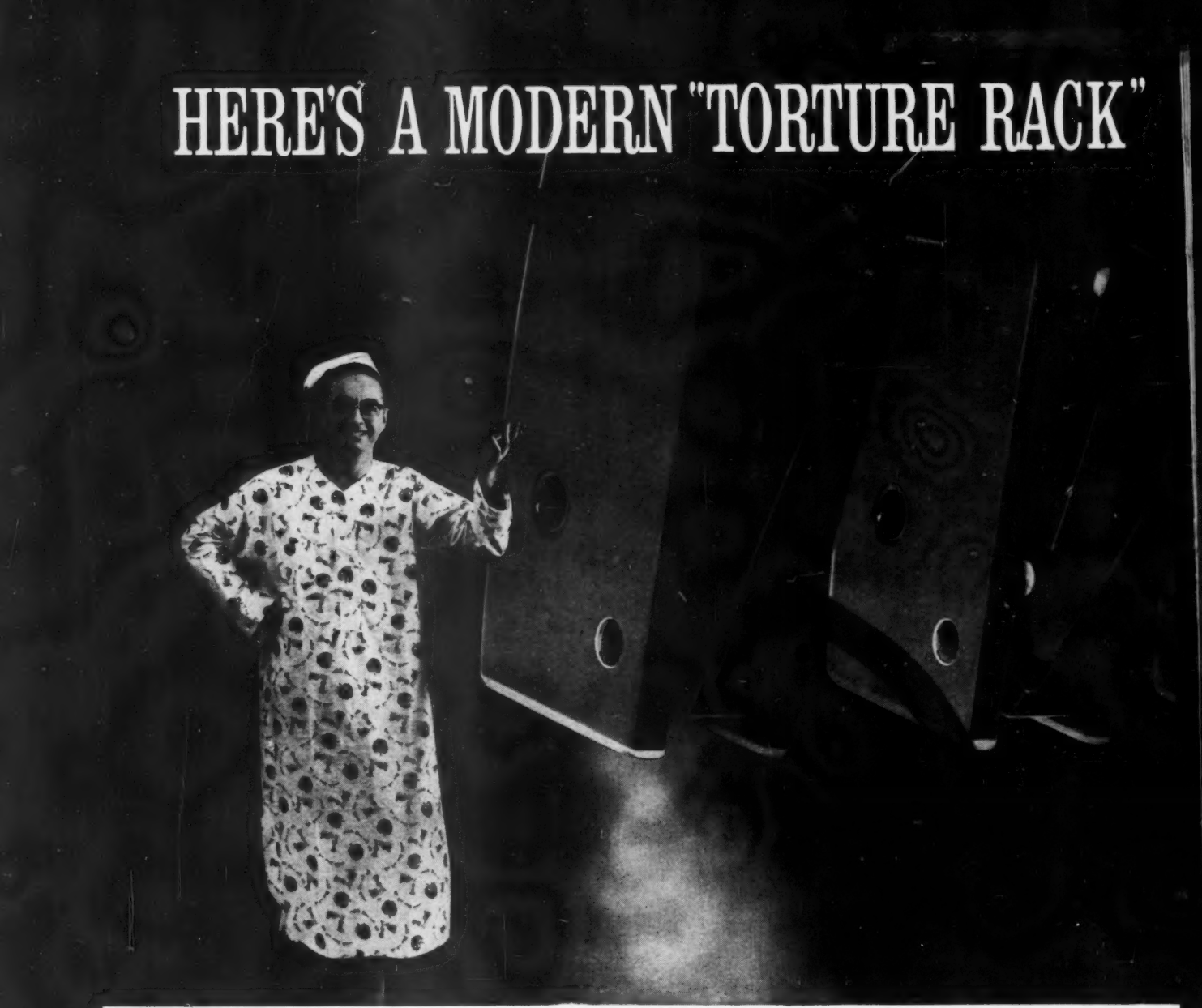
Lots of utility men have come to accept the old reliable fuse cutout as so commonplace that it can be bought from a catalog like a piece of hardware . . . considering all makes equal in performance.

You'd never dream of short-changing yourself when it comes to protecting your generators or large transformers. Why not the same regard for *distribution* protection?

It will pay you to investigate the real difference in fuse cutout values. Development testing at Westinghouse's High Power Laboratory guarantees that extra value in Westinghouse fuse cutouts. J-60949-1

See how Westinghouse makes "protection buying" A Sure Thing *(turn page)*

HERE'S A MODERN "TORTURE RACK"



A truly universal cutout...type EU

Exhaustive testing at the Westinghouse laboratories proves the ability of their new universal EU cutouts. The stop-motion photos above show one stage of testing the EU cutout . . . satisfactorily interrupting an 8000-amp fault. Controlled current interruptions with maximum asymmetry insure capacity to handle over and over the most severe faults which will occur on your system.

But interrupting tests are not enough. Before a new design is ready for sale, temperature rise, radio influence, impulse tests, wet and dry withstand tests, vibration and shock tests must be completed. They are your assurance that you are getting the best protection your dollar can buy.

Ask your Westinghouse sales engineer today for complete test specifications and a demonstration of this cutout in your own office . . . or, for complete information, write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

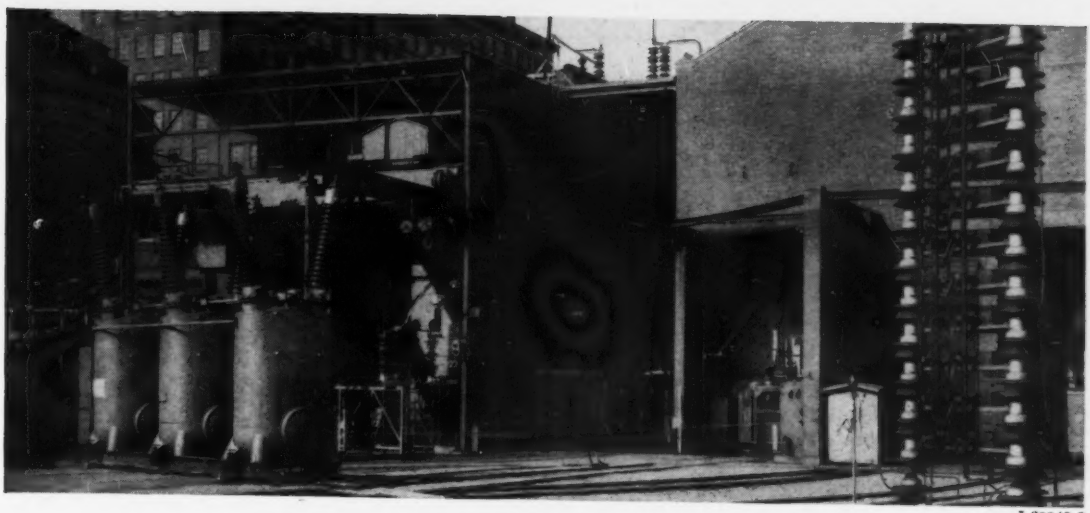
WESTINGHOUSE HIGH POWER LAB

Anyone with a transformer, a circuit breaker and a cutout can carry out interrupting tests, but it's a different story for *fundamental* research! Investigation of tube rocket action, erosion and current clearing ability is a time-consuming process requiring years of engineering experience and extensive test facilities found at the Westinghouse High Power Lab. J-60949-2

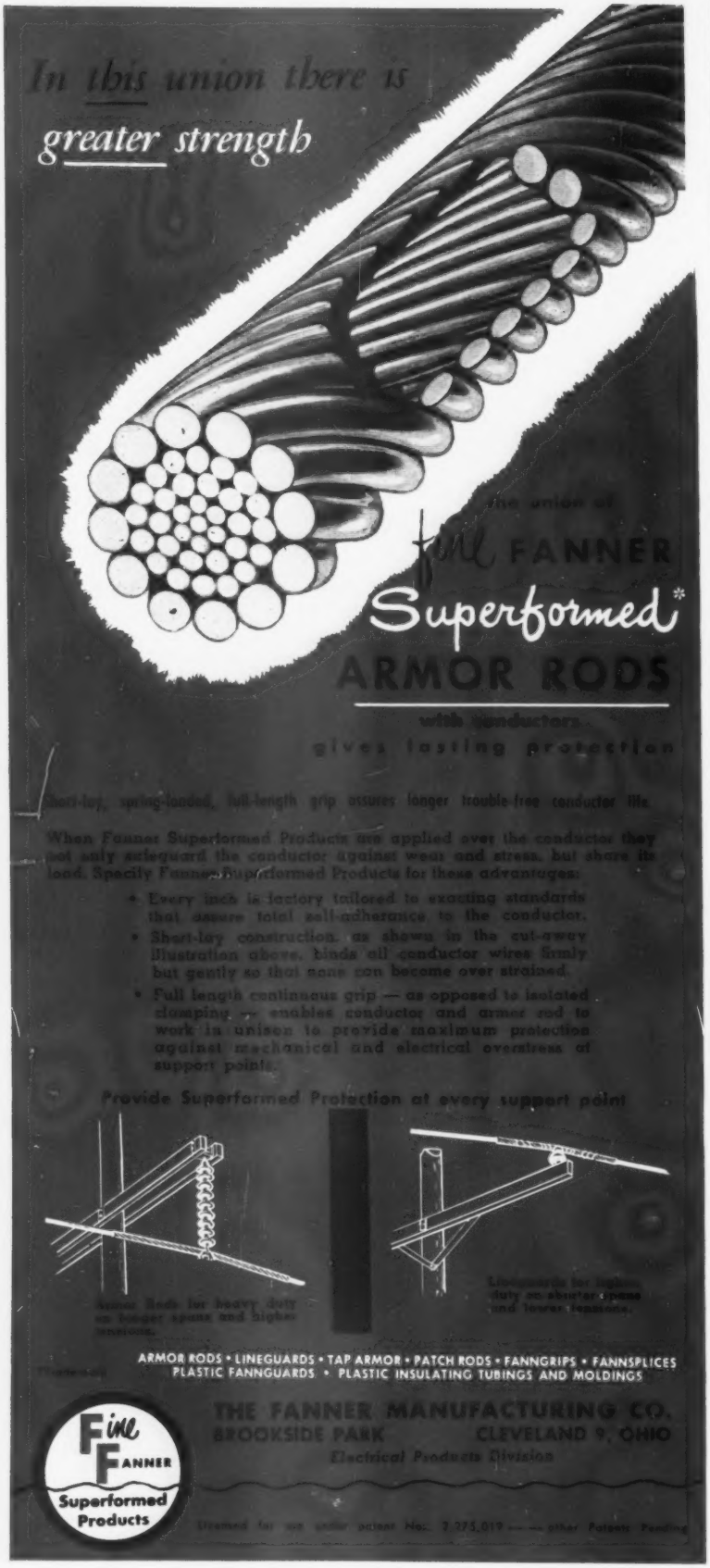
YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

THAT DEVELOPS BETTER CUTOUTS



J-60949-3


In this union there is
greater strength
the union of
FANNER
Superformed*
ARMOR RODS
with conductors
gives lasting protection
Short-lay, spring-loaded, full-length grip assures longer trouble-free conductor life
When Fanner Superformed Products are applied over the conductor they not only safeguard the conductor against wear and stress, but share its load. Specify Fanner Superformed Products for these advantages:
• Every inch is factory tailored to exacting standards that assure total self-adherance to the conductor.
• Short-lay construction, as shown in the cut-away illustration above, binds all conductor wires firmly but gently so that none can become over strained.
• Full length continuous grip — as opposed to isolated clamping — enables conductor and armor rod to work in unison to provide maximum protection against mechanical and electrical overstress at support points.
Provide Superformed Protection at every support point
Armor Rods for heavy duty on longer spans and higher tensions.
Lineguards for lighter duty on shorter spans and lower tensions.
ARMOR RODS • LINEGUARDS • TAP ARMOR • PATCH RODS • FANNGRIPS • FANNSPLICES
PLASTIC FANNGUARDS • PLASTIC INSULATING TUBINGS AND MOLDINGS
THE FANNER MANUFACTURING CO.
BROOKSIDE PARK CLEVELAND 9, OHIO
Electrical Products Division
Fine Fanner
Superformed Products
Licensed for use under patent No. 2,375,019 — other Patents Pending

ELECTRICAL BOOKS

ROME CABLE MANUAL OF TECHNICAL INFORMATION, 393 *pages*, 5x8, *Rome Cable Corp.*, $4.50.

The second edition of the Rome Cable Manual of Technical Information is now available. Revision of the manual keeps pace with technical advances and changes in wires and cables since 1947, the date of the first edition. Also reflected are changes in industry standards, regulations and practices in the last decade. Particular emphasis has been placed on the newest materials and methods in the field.

MANAGEMENT FOR ENGINEERS, 453 *pages, by Roger C. Heimer, McGraw-Hill Book Co.*, $6.75.

This book takes a practical look at the impact of costs, standards, materials, methods, taxes, insurance, power, equipment, labor and ethics, and shows the relationship between them and engineering considerations. The fundamentals of business cost considerations are described. The book is intended to acquaint the reader with the day-by-day workings of a business firm both as an economic institution and as a coordinate organization made up of individual participants.

MAJOR APPLIANCE SERVICING, 285 *pages*, 5¼x8, *by Percy T. Brockwell Jr., McGraw-Hill Book Co.*, $5.95.

In clear, simple language, this new book provides the over-all groundwork needed for quick, efficient repair work on such major electrical appliances as washers and refrigerators. The book covers both 115-v and 230-v appliances, including conventional and automatic washers, rotary ironers, vacuum cleaners, dishwashers, garbage disposers, electric dryers, electric ranges, electric water heaters, refrigerators, freezers and room air conditioners. Fundamentals of construction and operation, for each kind of appliance, are stressed so that professional repairing techniques can be applied effectively on any appliance regardless of make or model. The book shows how to trouble shoot, how to use testing devices and how to do both electrical and mechanical repairs.

ECONOMIC OPERATION OF POWER SYSTEMS, 260 *pages*, 6x9, *by Leon K. Kirchmayer, John Wiley & Sons Inc.*, $12.00.

Discussed in this book are "electronic brain" methods utilized by electric utilities for economy in production. Experience has shown that the application of these methods to power systems has effected notable monetary savings through accurate consideration of transmission losses. The book emphasizes theoretical developments and computer use in dealing with and solving system problems. It shows how matrix methods are employed to derive transmission loss formulas, which in turn are the basis for computational procedures applied to computers. The proper use of analog and digital computers to obtain transmission loss formulas and generation schedules is also described. Additional features of the book include mathematical models, analytical methods and computer applications to prediction and improvement of performance of systems, and many new theories and tools of power system operation.

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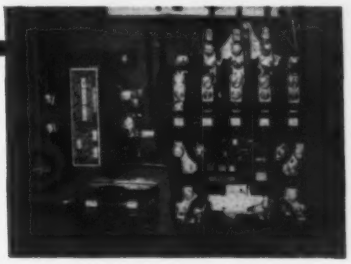

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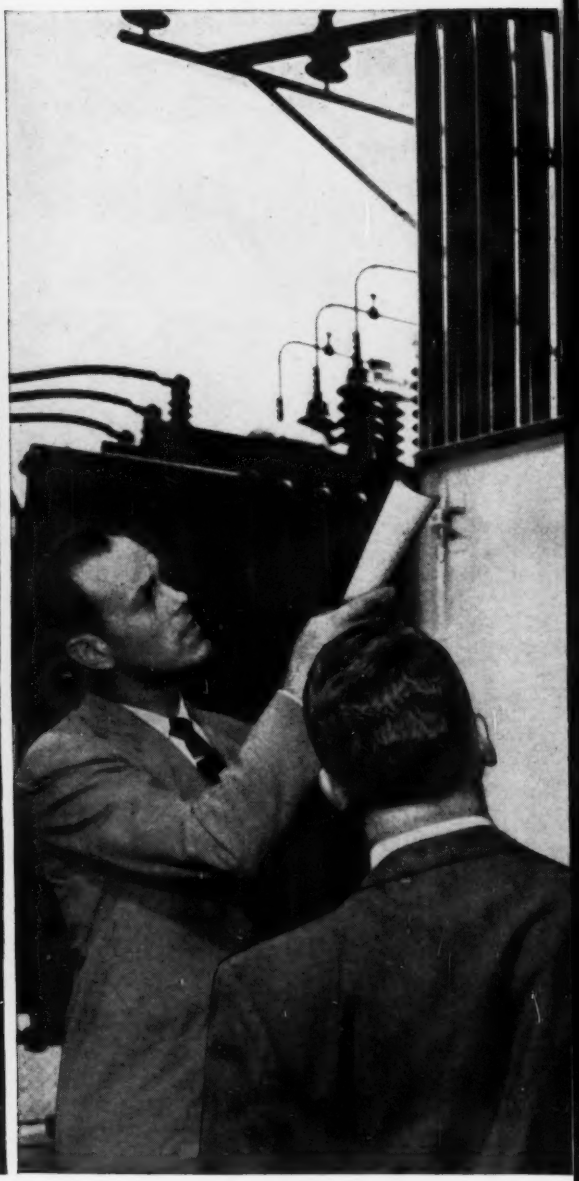

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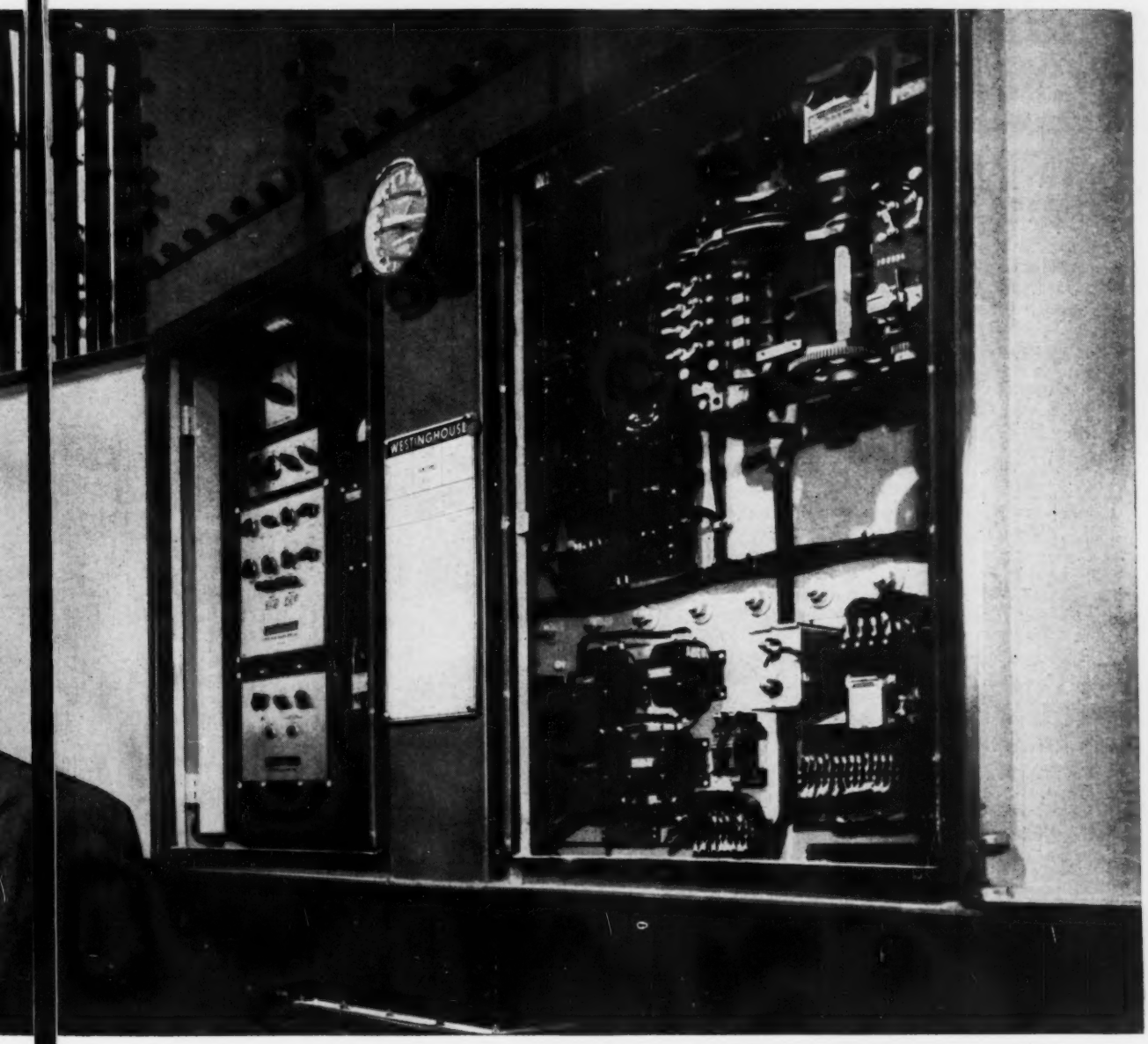

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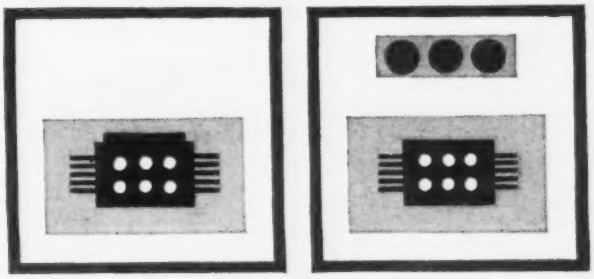

SMALLER SUBSTATION AREA — The single-unit LTC transformer occupies far less area than that required for a substation transformer with three feeder-type voltage regulators.

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ELECTRA'S HUSBAND

"Something Must Be Done"

ALL through dinner I could see Electra loading her guns and marshaling her forces. As she poured the coffee, she let fly.

"You're going to have to raise my allowance," she demanded.

"All right," I said resignedly. "What happened today that you got into such a tizzy?"

"It isn't today, it's every day." Electra was real serious. "You've always been the great advocate of having a houseful of electrical servants and always keep telling me how little they cost to operate. What you've been concealing from me all these years is the cost of keeping them operating, and that's why I want more allowance."

"What's the matter?" I grinned. "Did the TV set blow right in the middle of your favorite soap opera this afternoon?"

"You know very well that I don't watch TV in the afternoon. It just so happens that we were all over at Ruth's for bridge today and got to comparing notes on how much we were paying to keep our appliances running. It was the best indignation meeting that we've had in months. We all decided that if you men can't design appliances so that we can fix them with a bobby pin and a can opener you're going to have to pay and pay and pay."

"Of course you're exaggerating, Electra, just to make a point."

"You think so?" she replied crossly. "Well just to show you, Smarty, I went back through my check stubs for the last two months and found out that I'd paid $53.25 on service calls—and you can write that check out right now."

"It does seem kind of high," I replied mildly, "but even so you would have had to pay a lot more for a cook, scrub woman, house cleaner and garbage man, not to mention the cost of movie tickets these days."

"And it's not only the cost of servicing these appliances," continued Electra. "It's the fact that these service costs raise the prices of a lot of other things. Elsie was telling us this afternoon that she called the doctor over to look at Junior's sore throat and the bill was $15. When she screamed, the doctor pointed out politely that she paid $7.50 for a house call on her television set and didn't she think that the doctor was entitled to a little higher fee than the television service man.

"Now don't interrupt me. Let me tell you about the experience that Joan had in trying to replace the little signal lamp in the base of her iron. She took it to five electric shops before she found a place that had the lamp and then they charged her a $2.55 minimum service charge to put in the lamp. And you know what the lamp costs? Eighteen cents. Any moron, in this day and age, ought to be able to screw a lamp into a socket. But, no, it has to be turned into a Hollywood production and costs just about as much."

"You're certainly steamed up over this situation. Have you got any other examples of this suppression of womanhood?"

"You bet I have—and it's no laughing matter. I'd like to hear what you would say if the disposal clogged up right at this time when you were in the middle of fixing dinner. Ruth had that happen and when she called the service shop, they told her they were so busy fixing appliances that they couldn't get a man there for two days. She called another place and the girl on the switchboard, after telling her that they too were so busy they couldn't come immediately, suggested she take the broomstick and try prying the rotor backwards. You know what? It worked. But she could just as easily have paid $10 to the service man for doing the same thing."

"You make a pretty good case, I admit, but after all these mechanical marvels you women all insist on having are mechanical—and they will break down occasionally."

"Maybe so, maybe so," agreed Electra, "but we girls still think there's a conspiracy to make them so complicated that the householder can't even do the most elementary repair job. At least half the time it's just some simple little thing that goes wrong, like the light in the iron.

"What we need is more do-it-yourself appliance servicing and I think that you people in the electrical industry should start thinking about designing these appliances to give us women and our budgets a break."

"I think there's already some thinking in that direction. At least I've heard of one manufacturer who is trying to design his product so that the parts most likely to give trouble can be pulled out as a unit and exchanged at the store."

"That makes a lot of sense and it's about time, too. Now do I get my increase in the allowance?" demanded Electra.

"No sense even going in there, Mac. I got the house mortgage this time!"

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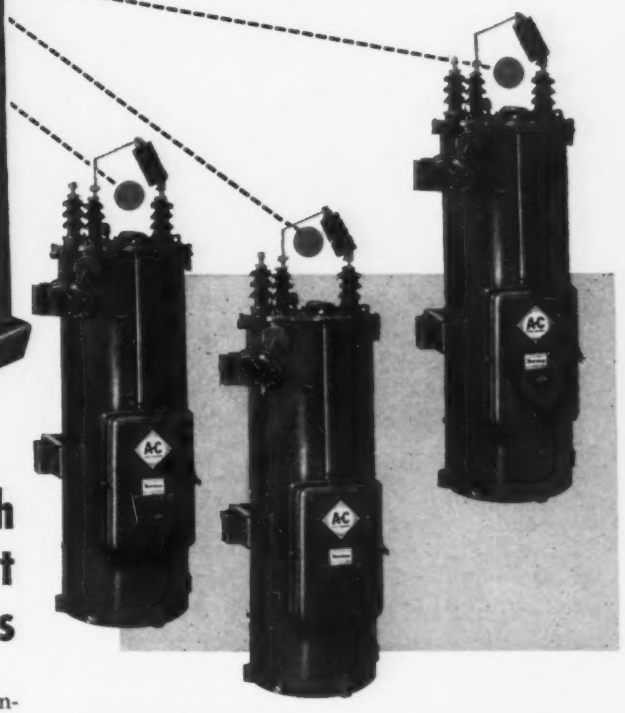

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editorial views

Electrical West Proposes

SOME WAY must be found by the investor-owned electric utilities to accelerate the construction of large atomic power stations. Failure to do so will inevitably result in action by the federal government to accomplish this same objective. A great many Americans both within and without the electrical industry view the incursion of the federal government into the thermal generating field with considerable trepidation. On the other hand, the development of a number of large scale atomic power stations by private industry is so costly at the present time that only a few of the very largest utilities can consider such action. A plan, therefore, is needed whereby all of the investor-owned utilities can participate in speeding the atom toward economical commercial use.

Electrical West proposes that the industry consider the formation of a new corporation which might be called the Atomic Power Generating Corp. The stockholders in this corporation would be the investor-owned utilities of the United States. The capital would be obtained by setting aside a fraction of a per cent of the gross revenue of each participating company—a sum that legitimately could be charged to "research contributions." The board of directors would be elected from the eminent authorities within the industry.

The Atomic Power Generating Corp. would be given the responsibility of carrying forward the atomic power program—under the auspices of private enterprise—but in essence a public trust for the development of the atom. Its board of directors would determine where and what types of atomic stations should be built throughout the U. S. Power from such stations would be fed into existing power pools and the revenues derived therefrom would cover the operating and part of the capital costs of such stations. Thus no one utility would own an atomic power station outright but all would have a share in **all** of the atomic power stations, which would be built as part of this atomic development program. It is conceivable that, in the somewhat distant future, this generating corporation might be supplying a considerable portion of the total U. S. power load. It is also conceivable, if private industry cannot move in this direction, that a network of federally owned and operated atomic power plants would be doing this very thing.

The idea of jointly owned power stations is not new but the concept of a generating corporation embracing all investor-owned companies is. At this time, when the industry needs both solidarity and good public relations, a program of leadership for the peaceful use of the atom should have a great appeal.

This concept may have many basic flaws, but in it there may be the germ of an idea that, cultivated by more astute minds in the industry, could grow into a practical solution for the perplexing political and economic problems posed by the atom.

New Angle

PRICE conscious, investor owned utility purchasing agents might be interested in a postelection conversation overheard between two suppliers. The gist of their remarks concerned the current price levels on certain types of electrical equipment and the powerful effect that this situation would have among the manufacturing fraternity. One supplier finally commented that concerted efforts on the part of utility purchasing agents to drive prices down too far below a fair value might not be an approved way of winning friends and influencing people. In fact, it might drive a lot of people out of the industry right at a time when friends and allies might be needed.

From this observation post, weak prices in certain areas do not seem to be the responsibility of either the manufacturers or the purchasers, singly or collec-

tively. Almost everybody gets into the act some way or other but the net result is always the same—a price for a product that will not support quality, research or progress if continued for very long. Within reasonable limits almost any experienced person can determine the fair value of a given product. The farsighted people of the industry try to keep within those limits. It is hoped that there will be enough of them to prevail.

More Engineering Needed

NEXT year the industry will be confronted with some revolutionary new industry lighting standards which, in many cases, will get recommended foot-candle intensities up to 200 or 300 for many eye tasks. It's not hard to get such intensities with modern lighting equipment. It is difficult to obtain these intensities without concurrent factors in the seeing process that may cause discomfort or dissatisfaction. Glare, contrasts, color combinations, all of the factors which now are considered as part of light conditioning, will be highly intensified as recommended illumination levels are doubled or trebled. Good engineering by trained lighting specialists plus the use of quality fixtures and light sources are indispensable ingredients of the industry's progress toward new and better artificial light. The alternative could be loss of public confidence in the industry's recommendations—or even motives.

Room at the Top

A New York executive placement firm predicts that a boom is under way to recruit highly paid ($15,000 and up) scientific-technical executives. More than three-quarters of over 600 companies surveyed reported that it is difficult to secure top technical-executive personnel who are really strong in administrative skills. Demands will become progressively higher year by year through 1965, when the search for such people will be in high gear.

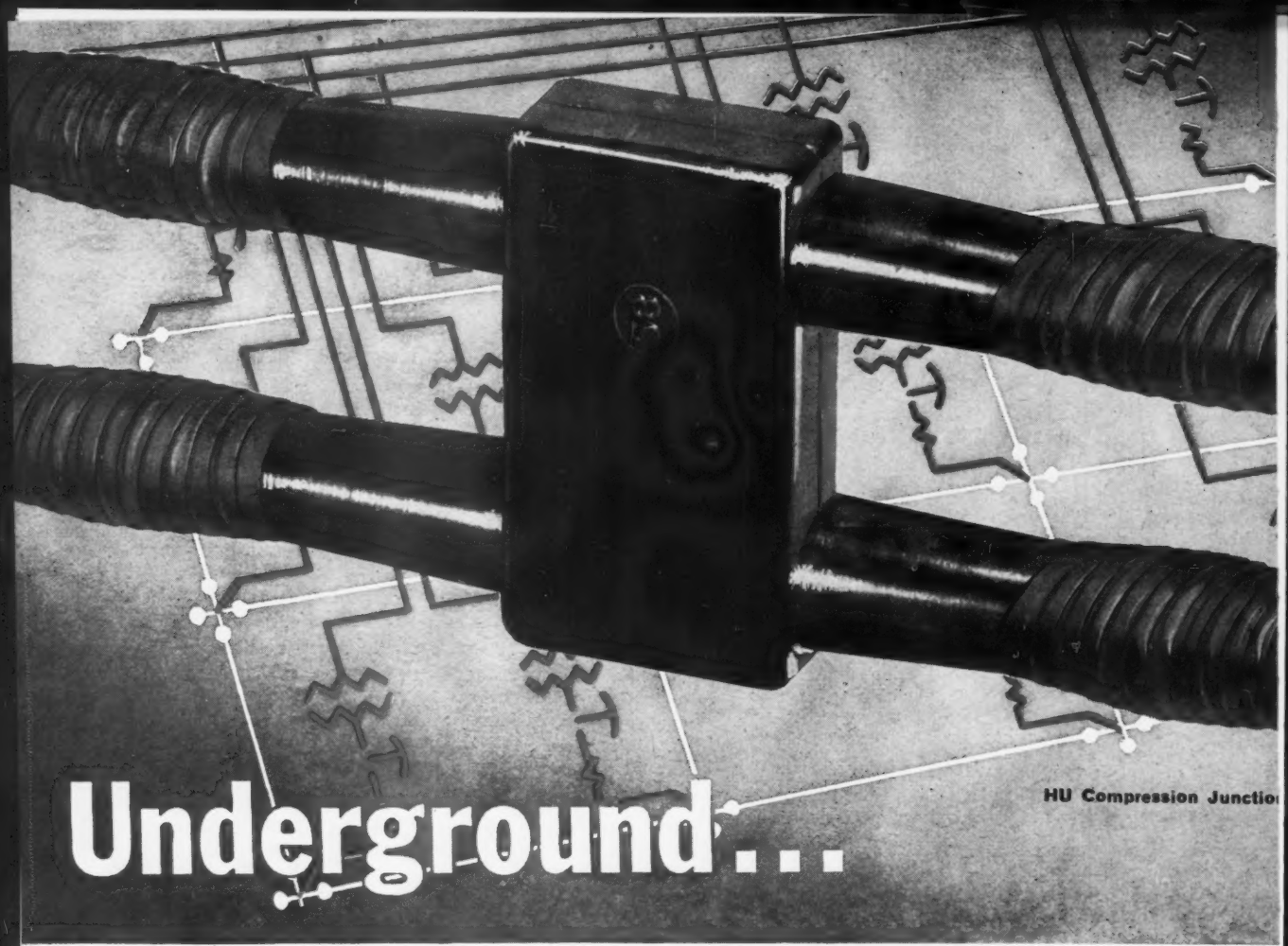
Ambitious young engineers may find that extracurricular self-education activities in executive development might pay off handsomely. On-the-job development in supervisory and leadership skills also helps set the stage for a jump into the high-salary brackets. Performance records rate high in the selection of men to fill the top ranks, according to the report. Truly the sky may be the limit for those who want to make the effort to reach high management levels.

New Load?

DOWN San Diego way, a new industry that may be very important to the electrical fraternity is in the embryonic stage. The Stinson Aircraft & Tool Engineering Co. will offer the modern version of the all-electric automobile to the public in 1959. Designated as the "Town-About," the new car will have a 77-mile range of operation and speeds up to 58 miles per hour on one charge of its replaceable cell battery bank. Its trim looking stream-flow body will be made of lightweight plastics and metals.

The utility industry has a more than passing interest in such a development. Stinson engineers estimate that 200,000 electric car owners could contribute more than $8,000,000 of revenue annually in off-peak recharging at night.

Despite certain obvious limitations, the electric car could find many applications in corporate activities. In utilities it could be useful as transportation for meter reading, service calls, maintenance and similar activities. It would seem appropriate that electric utilities should be the first to test out a few of these units in actual service, both to find out their practicability as a mode of transportation and to determine the potential off-peak load that might be developed if electric automobiles replace their noisy, smog-producing counterparts in any substantial quantity.



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ELECTRICAL WEST

VOL. 121, NO. 7
DECEMBER 1958

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

This is the first of a series of Electrical West interviews with industry leaders, discussing topics that are pertinent and timely. Here Washington Water Power Co.'s president, Kinsey M. Robinson, tells . . .

President Kinsey Robinson and George Brunzell, executive vice-president, discuss phases of dual operation

Why Water Power Took On Gas

WASHINGTON Water Power Co. was organized in 1889 to develop the mechanical power from Spokane Falls and became the electric utility in the area when it took over the bankrupt Edison Electric Illuminating Co. Because of WWP's long history in the electric business and its vigorous promotion of that service, Electrical West sought this interview with President Kinsey Robinson on the philosophy behind the company's purchase of the Spokane Natural Gas Co. and integration of the two systems. Following are the editor's questions and Mr. Robinson's answers:

Why did Washington Water Power Co., for years a single-operation company, decide to go into the gas utility business?

Natural gas was brought into Spokane approximately two years ago, when the firm that acquired the old Spokane Gas & Fuel, a manufactured gas company, came in and built a tremendous number of gas mains. In fact, at the time we took over it had 10,000 customers and enough gas mains in the streets and alleys to serve 40,000. Financially it was in bad shape and would have been unable to pay any dividends before 1962. It seemed to us that somebody had to take over the gas system who had the credit and the money to go ahead and develop the business.

Why your company rather than an independent group?

We gave a lot of consideration as to whether it would be better for the public to have two separate companies operating the two different types of service. This is a scattered territory, Spokane being the largest town in our service area, and the way that the gas had been installed and with the money that had been spent it would have been difficult for any new organization to come in and take over. Of course one of our biggest drops in annual expense came from the fact that we were able to finance the program at a very much lower interest cost than was being done by Spokane Natural. Then we believed that we could operate the property at a lesser expense than any independent company that had to set up duplicate offices and organization and that, therefore, we would be able to supply a lower cost industrial gas for this area than anyone else.

Would it not have been to your advantage as an electric company to let things take their course?

With continuing population growth, low cost industrial gas is essential if the people who grow up in this area are going to be able to remain and work here. Our company is here to stay, we hope, at least in the electric business, and there is every indication that we will do so. Therefore, our interest is in the over-all development of the area that we serve with electricity. If we can serve gas, particularly industrial gas, at a lower cost, then we believe that we will advance the day when we can do a much larger industrial business. The jobs that will come along with it will support many new families and homes that will need gas and electric service.

Don't you think that gas is here only temporarily? Will not all industrial and commercial applications eventually be electric?

No, I don't think that is so because there are many, many industrial applications that cannot be taken care of by electricity. You must have some type of fuel heat. So far as the supply of gas is concerned, if our information is correct there is certainly plenty of gas to the north of us, in Canada, that will be seeking a market for many, many years to come.

How does the public regard this dual operation?

Certainly the majority of the people in our service area are more than pleased that we have taken over the gas business. In fact, in our Spokane hearing, we had only one intervenor and later when we were purchasing the Cascade Natural Gas Co.'s Lewiston, Idaho-Clarkston, Wash., system we had no intervenor or protests. We've heard nothing except favorable comments from our

"In the over-all, we think that a combination company in an area such as ours is very much in the public interest and will not be a detriment to our customers, our stockholders or our employees."

customers since we have taken over the gas business. In the over-all, we think that a combination company in an area such as ours is very much in the public interest and will not be a detriment to our customers, our stockholders or our employees.

About how many customers and how many employees did you take over?

We took something less than 10,000 customers, mostly in the Spokane area, and about 90 employees. The employees have been integrated into the Washington Water Power organization and part of them are engaged in the general work of the company, others in the electrical part and the rest in the gas part of the business.

Is it true that you are integrating the two services in most departments?

Yes, we are fully integrating the properties of the gas company with the electric part of the business. The accounting is all done by the same group of people. Billings will be on one statement. We are highly mechanized in our customer billing. Our meter reading will be done by the same men and as soon as we can fully integrate the servicemen they will do both gas and electric service work.

Have employees of both organizations taken to the integration well?

So far as we know there has been no complaint. To date very few Spokane Natural employees have left the employment of the company and I don't think that they will. Their fringe benefits and wages are much better under the Washington Water Power Co. organization in most cases than they were in the old gas company. The people who were formerly members of another union have all joined the International Brotherhood of Electrical Workers, the union that we had for our outside people prior to the purchase, and everything seems to be working out very nicely.

Have you had any special employee training programs for the new people?

We haven't had too much organized training because we only took over the Spokane Gas property on the second of June and we've been so busy getting and connecting customers that we've had very little time to give the normal amount of training for new employees.

Will that come later?

We'll have an opportunity to do that this winter after we can no longer lay mains or services.

Will sales activities also be integrated?

Yes, fully.

Can the customer still be king in a dual operation?

We think so. We've watched the operation of Montana Power, a company that has a substantial amount of gas; the Arizona Public Service Co.; Public Service of Colorado; and Pacific Gas and Electric Co. and we believe that the customer has a better opportunity of getting the service that is most adaptable to his use. We believe that if we push both services, with the strong electric dealers and the strong gas dealers organizations that we have here now, each of our customers will have an opportunity to get the service that is best adapted to his particular use and benefit.

How, for instance, will you handle electric heat promotion in competitive areas?

We will continue to promote electricity along with gas for heating purposes. There always will be people who prefer electric heat even though it's more expensive and those people are entitled to that service if they want it. The others will be given a true story of the comparative cost of gas and electric and will be able to choose for themselves the type of service they want.

People have been watching your electric heat promotion with a good deal of interest. Some of them wonder if from a practical over-all operating standpoint you can afford to continue active, aggressive promotion of this service.

Well, up to the time you reach a certain percentage of your total customers using electric heat there's probably sufficient diversity so that you can continue serving that type of service as long as the customer is willing to pay the cost of it. There are still people who buy Cadillacs and Lincolns and people who buy Fords and Chevrolets and I think you can make the same comparison for types of heating people want in the home.

I understand that so far as domestic load is concerned you are going to concentrate on gas for house heating, water heating and incinerators. Is that true?

That is a natural market for gas so far as homeowners are concerned. However, we have at the present time some 96% saturation of domestic electric cooking, almost the same saturation of electric water heating. I don't believe any of those customers will convert to gas operation, unless it would be to water heating at some future time, should a tank burn out. Then the customer might decide, provided he has a gas furnace in the basement, to put in gas water heating. The gas incinerator is a new thing and I think it is one of the articles that will be very popular in the area and that many of them will be sold.

As a combination company, what expenditure in money and effort do you believe is justified in support of such programs as the Edison Electric Institute's Live Better Electrically promotion?

From the standpoint of our own company, we are not justified in spending a very large sum as our residential kwh use (over 8,200 average) and saturation of major appliances (more than 95% for both electric ranges and water heaters) puts us in a somewhat different position than many companies.

Are gas and electric rates competitive in this area?

Well, it depends upon the service. Gas is cheaper than competitive fuels for industrial heating. Gas is competitive so far as residential heating is concerned. I think it would be competitive to electric water heating if the customer already had a gas furnace in his home. Gas is not cheap in this area. It is brought in by long pipelines and therefore the rate is rather high as compared to many other areas served by natural gas. Secondly, this was a pretty well defined electric area so far as popular sentiment was concerned and it's not an easy job for us, even with our organization and ability, to build a gas load. However, it is coming along at a very good rate, taking into consideration the fact that we didn't really get into business until after

the first of July. Of course, with the cold weather in this area we will have to stop our building at an earlier date than in some other parts of the country but 1959 and 1958, too, are going to show good progress in the gas business, we think. Everything to date indicates that this will be the case.

Do you anticipate rate increases in either service?

Well, certainly we don't look for any increase in gas rates. We don't think it is necessary unless we get some increase in price for the gas from the pipeline, which we don't anticipate at the moment. As for electric, only time will tell. We probably will have to give thought to a rate increase in the electric part of the business at some later date.

In what percentage of your system do you serve both gas and electricity? What percentage of your total meters are gas?

Gas service is available in limited parts of the area, which is covered by 70% of the total system customers. Gas meters total 7% of the total electric and gas meters.

Do you expect to extend the gas service to other areas?

We expect to extend the gas service as rapidly as possible wherever it is economically feasible.

Can you house the two organizations with your present facilities?

It is very lucky that we had our new headquarters building under construction and ready to occupy about the time we took over the gas business because, with already crowded facilities, the old building certainly would have bulged if we had tried to add the gas organization to our electric organization.

Had you started this building before the purchase was contemplated?

Oh yes, we started this building better than a year ago before we knew that there was any possibility of taking over the gas business. We occupied the service building and warehousing part of this project in the fall of '56 and at that time we built the basements for the cafeteria and the office building and covered them up until we finally completed our plans for those sections.

Would you care to say anything about your financing?

Well, we've been very fortunate in our financing. We have very good commercial bank credit. We've had loans for as much as $48,000,000 at a time, mostly at the New York firm rate or at the firm rate plus a quarter if the loans ran for a much longer time than one year. We have a very good credit rating so far as our bonds and debentures are concerned and while they are rated at medium grade A they sell at a price that is considerably in excess of that. Our only stock issue since 1928 was a 200,000-share sale in July that was sold out in one day, with most of it going into the Northwest and Pacific Coast states.

Are you contemplating another stock or bond issue?

We have no definite plans for selling any more common stock. We must do something early next year so far as bonds or debentures or additional bank loans are concerned to keep our financing ahead of our construction program. We are now spending about $2,500,000 a month on the Noxon project, which won't be finished until early 1960. It is a 400,000-kw hydro project on the Clark Fork River in western Montana where the plant and the transmission lines will cost approximately $87,000,000.

Did you get a business loss tax write off when you took over the gas properties?

Very little because under the tax laws of 1954 you can only take losses of a merged company if it is smaller than the parent company on a ratio of the size of the two companies.

Are earnings under PUC based on the integrated operation?

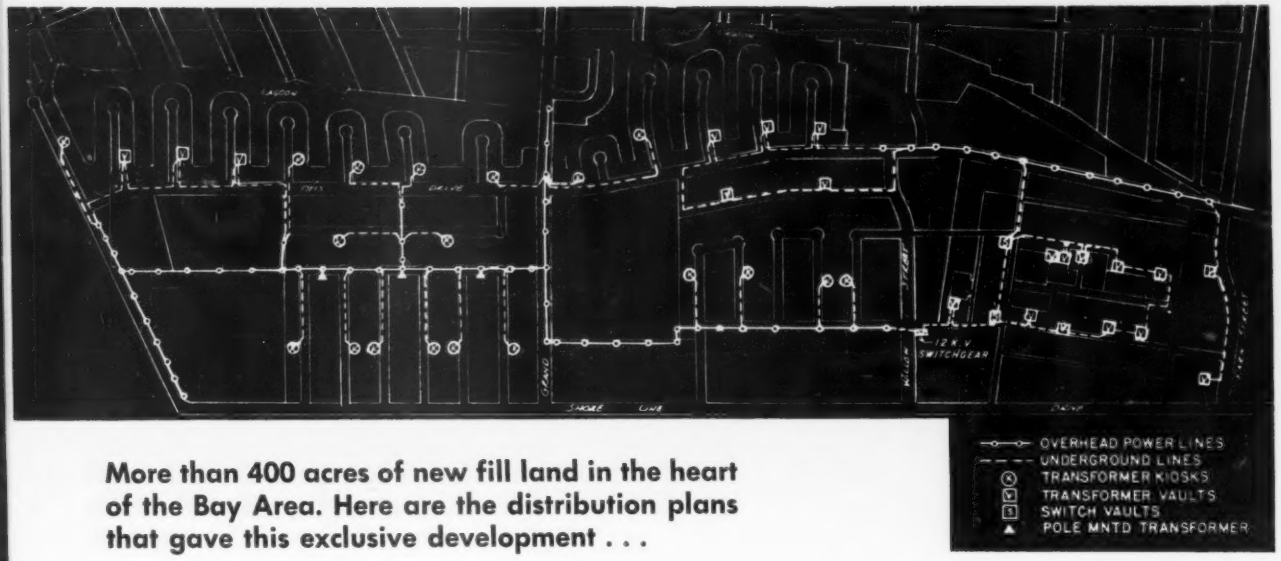
No, the rates for the electric and for the gas service will be computed separately and neither one can subsidize the other.

Do you plan to build any steam plants in the immediate future?

Ownership of the gas probably will not determine the date that we build a steam plant. Steam will come into the base load of the Pacific Northwest within a few years simply because the amount of hydro that is economically feasible left in the Columbia and its tributaries is dwindling every year. The best estimates seem that the amount of economical hydro is not more than six or seven million kw beyond what is now under construction or licensed for early construction.

Light Comes to South Pass

Pacific Power & Light Co. lineman, Keith Lovell, lugs coil of conductor down main street of this Wyoming town, where electric lights brightened a former gold mining camp for the first time in the history of the century-old community. Electric service heralds prospects for a revival of the town stemming from Columbia Geneva Steel's interest in vast deposits of taconite ore nearby. The corporation has called for bids for a $16,000,00 plant to process low-grade iron ore and concentrate it to a higher-grade product for shipment to Geneva, Utah, steel furnaces.



More than 400 acres of new fill land in the heart of the Bay Area. Here are the distribution plans that gave this exclusive development . . .

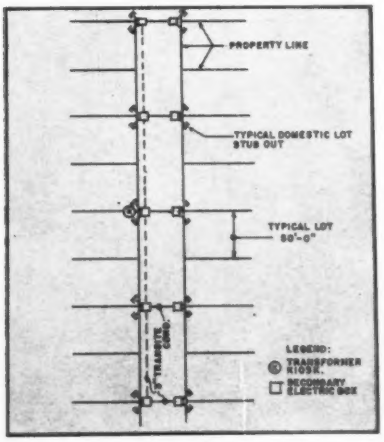
Residential Underground for

Stephen Lindheim and W. E. Dunn

Schwartz & Lindheim
Oakland, Calif.

The South Shore development in Alameda, Calif., demonstrates the feasibility of an underground distribution system at a cost well within the reach of the progressive developer. A premium cost of $145 per lot for the underground power system, and $25 per lot for underground telephone, shows what complete cooperation between the developer, the utility company and the engineer can make possible.

The development covers an area of 412 acres including 50 acres of lagoons. The land was created when Utah Construction Co. dredged 9,500,000 yd of fill from the bottom of San Francisco Bay. Alameda Bureau of Electricity is the serving utility.



Typical secondary distribution. Ducts are adequate for three-phase use

I—Design Criteria

Design criteria for the electrical distribution system demanded service equal in performance to an overhead distribution system. To accomplish this, each transformer was limited to serving 25 lots within a radius of 300 ft of the underground distribution transformer. Viewing the ever-increasing use of electricity in the home, ducts for the secondary distribution system were sized to accommodate any foreseeable increase —even three-phase service to each and every residence if and when the need develops. A careful cost analysis indicated that a single transverse pole line (see diagram) would greatly improve the efficiency of the overall system, and at the same time materially reduce costs for a given degree of reliability. No overhead services emanate from this pole line, giving it a clean, uncluttered look. The entire secondary electrical, street lighting and fire alarm systems are underground. As this backbone pole line approaches the shopping center, it is terminated in a line-up of 12-kv S & C outdoor

Summary of Developer's Underground Electrical Costs

Electrical distribution	$145	per lot
Telephone distribution	25	per lot
Adjusted cost of street lighting	125	per lot*
Adjusted cost of fire alarm	55	per lot*
	$350	per lot

*Required to be underground by code.

Spacious, uncluttered appearance is afforded by underground services. Below, a service entrance coming from a sidewalk terminal compartment

$145 Premium

switchgear, and the primary goes underground. This gear incorporates all of the necessary devices for the main loops through the development and the shopping center, as well as provisions for feeds to surrounding areas as yet undeveloped. In the pole-free shopping center, sectionalizing switches are used at each transformer location, enabling the shopping center to operate as a primary selective system.

The reasons for placing electric utilities in the streets rather than on rear lot lines are as follows:

1. Street side service eliminates the placing of structures on properties where they might interfere with future utilization of the property.

2. Places meters at front of houses, making it easier for reading and less complaints about dogs, etc.

3. Simplifies maintenance. No need to get heavy equipment into back yards.

II—Two Distribution Methods

The design criteria dictated that distribution of primary power from the pole line to the transformers be achieved in two different ways.

1. Wherever possible, a radial system was used with one transformer being fed from each primary feeder. Primary cutouts on the pole were used to protect the primary feeder. Self-protected transformers were used, eliminating the need for protective devices in the underground enclosure. The transformers were installed in semiburied concrete kiosks which could be easily removed from view by proper landscaping.

2. A looped primary system was used wherever it was impossible to feed each transformer individually. In this system the transformers were installed in vaults along with a sectionalizing switch. Here again, self-protected transformers were used so that no additional protection would be required in the vaults. Fuse cutouts were used on the poles at each end of the loop.

The Street Lighting System

The street lighting system was installed at a cost of $280 per lot ($490 per pole). This figure is unrealistic because of the large portion of the system that does not pertain to the residential areas. A more realistic cost figure could be obtained by an area breakdown. The total area considered here is 140 acres. If we assume 1/5 of an acre per residence, we would have 700 lots. On this basis, the installed cost of street lighting would be $125 per lot—a much more favorable figure. Another consideration is the quality of the lighting job. Maximum spacing of the luminaries is 100 ft on main thoroughfares and 150 ft in the residential areas. Concrete standards were used throughout, slightly increasing the first cost, but eliminating any future painting or maintenance. In a coastal region such as Alameda, this is a very important consideration.

The Telephone System

The telephone distribution system also used two techniques depending on the physical layout of

Telephone terminal box for four houses

Left, precast concrete vaults throughout. A sectionalizing switch was used at each take-off point in shopping center primary loop.

Right, a completed transformer installation. Four-part aluminum waterproof covers can be opened by one man

S & C 12-kv loadbreak air switchgear is used to terminate section of overhead, started underground loop through shopping center. Below, only street-lighting standards show. Concrete poles used to cut maintenance

the lots. In most of the areas, back lot easements were employed, and the system was installed entirely by the Pacific Telephone & Telegraph Co. In this area it used direct burial cable with terminals on enclosed pedestals (see photograph) above ground. This is the first installation of this type in the immediate area. The first portion of the development was used as an experiment by PT&T and was installed at no cost to the developer. Future portions of the development where this system is to be used will be installed by PT&T but the developer will participate in the costs where they exceed the costs of overhead construction. In areas where it is impossible to have back lot easements, sidewalk distribution was employed. In these areas, the developer installed all necessary duct lines, sidewalk boxes, junction boxes, terminal boxes and conduit stubs onto each lot. The individual home builder then runs conduit from the stubs into each house. All cable, wire and related equipment was installed by PT&T.

The fire alarm system was worked out in conjunction with the Alameda Fire Department, and is designed to give complete coverage to the entire development. The entire system was installed by the developer at a cost of $120 per lot. Here again, the costs are unrealistic because of the large portion of the system which is not serving the residential area. Adjusting costs in the same manner as for street lighting, the installed costs would be approximately $55 per lot.

The Alameda South Shore development, with its absence of unsightly poles lines and its clean, trim look, stands as an example of what can be achieved, at reasonable costs, when the developer and the serving utility work toward a common goal.

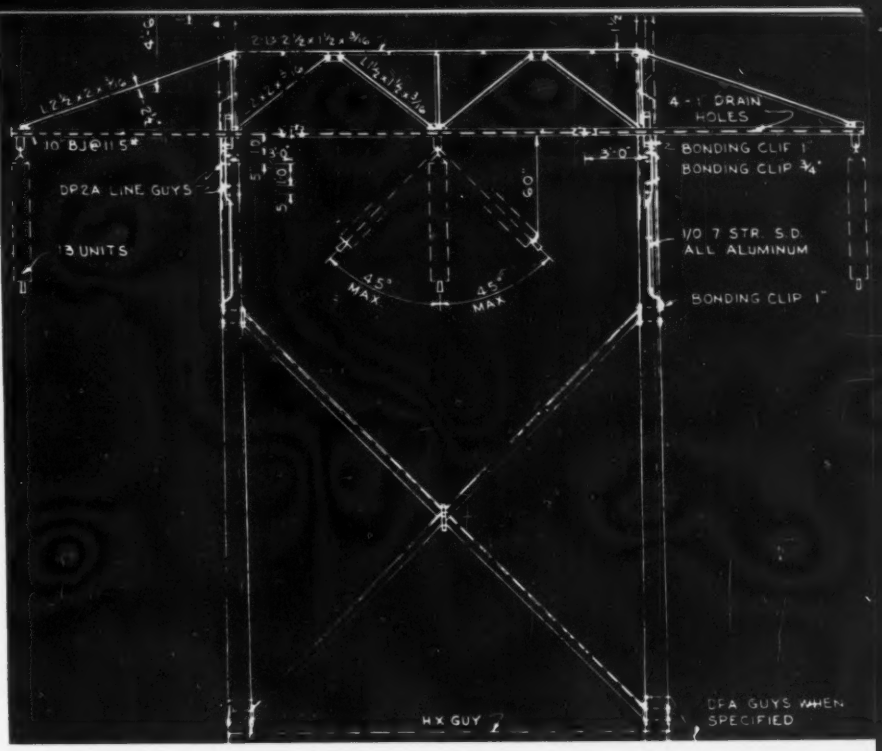
Use of precast pole bases saved money as installation was completed by electrician and laborer. On the site construction requires five crafts—labor, carpenter, steelworker, cement finisher, electrician

I—Steel Crossarm for H Frame

Bonneville Power Administration has placed an order with a steel company to fabricate and test truss-type steel crossarms for use on 115- and 230-kv wood pole lines.

This truss crossarm is designed so that it may be assembled on the ground rather than on the pole. The completed truss is then hoisted into place on the face of the poles and bolted. A galvanized steel joist, with one flange resting against the poles, forms the lower chord of the trussed arm. The estimated weight of the 115-kv crossarm is 400 lb. The estimated weight of the 230-kv crossarm is 900 lb.

These crossarms are designed for use in the area west of the Cascade Mountains, where the abundant rainfall accelerates crossarm deterioration. While these steel arms reduce the impulse strength of the structure, this is not objectionable because lightning storms in this area are relatively infrequent. It appears that these steel crossarms will not cost appreciably more than the present spar-type arms, with associated hardware, and will reduce maintenance costs.



Trim-appearing crossarm, designed to replace wood arm, will cut maintenance costs

Two Transmission Ideas

Forest Farr
Matthew Margerrison
Bonneville Power Administration

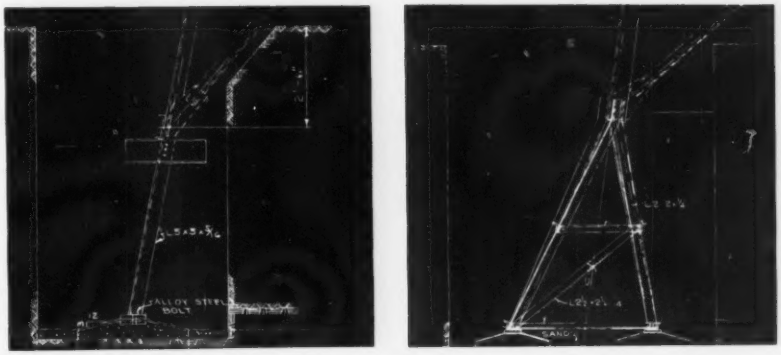
II—Low-Cost Anchors

Recently completed laboratory tests have proved out galvanized pressed plate foundations for use on steel transmission structures. They will be used in place of the conventional grillage foundation commonly fabricated from structural I-beams, WF-beams and channels. It is estimated that *a 40% to 50% saving in steel* can be realized in the use of these plates over the conventional grillage.

The present plan is to use these anchors in four standard sizes to make up the foundations for all types of towers now in use.

The ordinary line-type towers will require one plate anchor for each foundation. The heavier-type line angle towers and strain towers will require three or four plates for each foundation, depending on the footing reaction. These plates are pressed into the form of a truncated pyramid, as shown in the illustration.

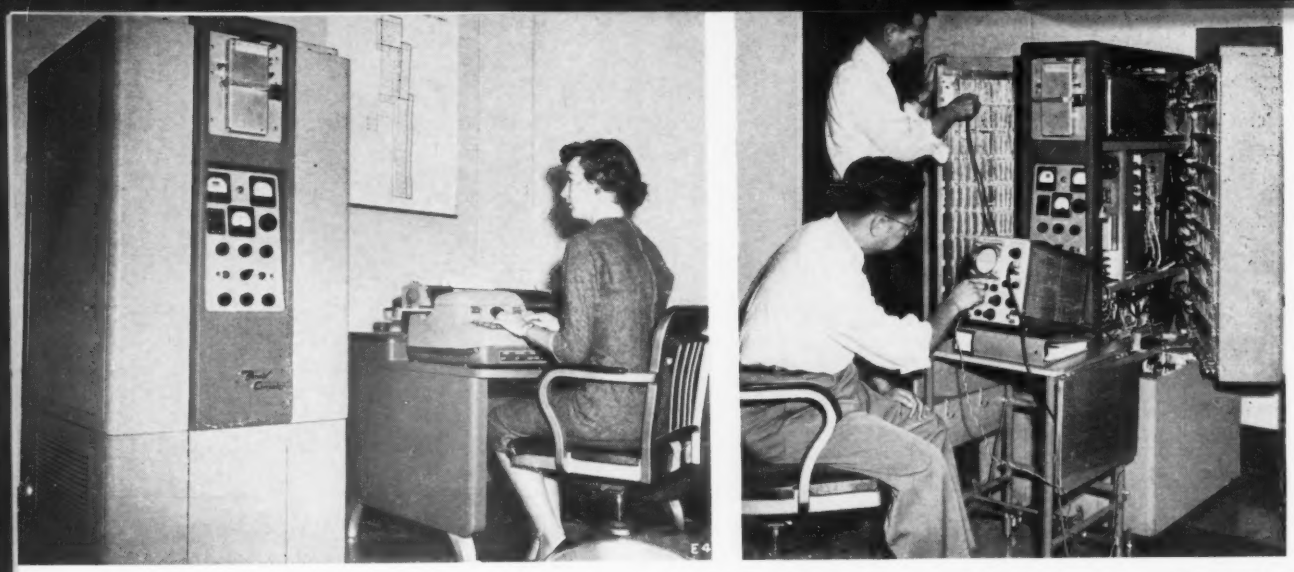
Sand or pit-run aggregate material will be used in the bottoms of the excavation to bed these plates so that the load will be uniformly distributed. Inspection holes are provided to insure that no voids exist under the plate.



Pressed foundation plate construction detail for standard (left) or strain towers

Anchor Characteristics

Size	Plate Thickness	Safe Working Load
24x24	¼ in.	24,000 lb
33x33	5/16 in.	45,400 lb
42x42	⅜ in.	73,500 lb
48x48	7/16 in.	96,000 lb



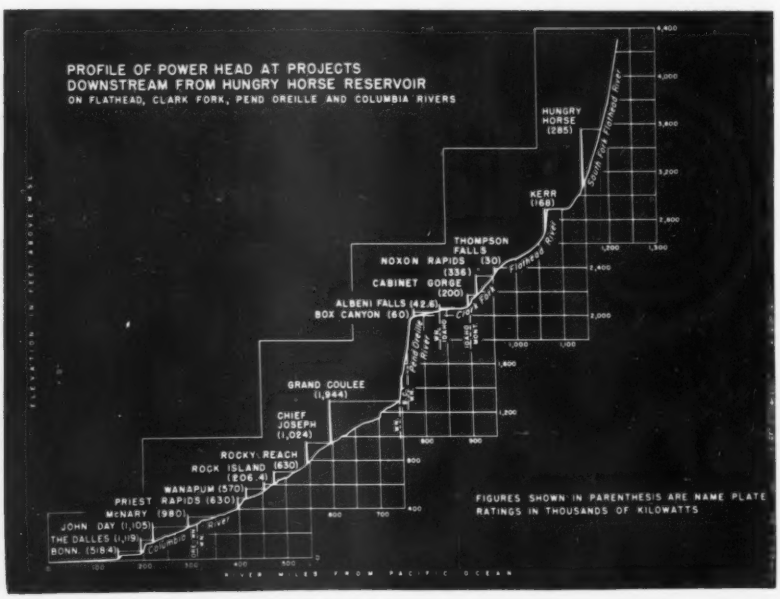
Nancy Martin prepares input data for a zonal wind velocity computation, right, BPA Engineers Jack Clubb, standing, and Don Wong run through a routine maintenance check of the computer. This computer is available to engineers on an open-shop basis

Here's how BPA puts . . .

A Small Computer to Work

Carl W. Blake, Bonneville Power Administration, Portland, Ore.

For the past few years Bonneville Power Administration operation engineers have been using a Bendix G-15A general purpose digital computer. The computer, installed in the branch of system operations and power resources, is being used primarily for the solution of problems arising in planning system operations for the scheduling of power from the federal hydroelectric plants on the Columbia River and its upper tributaries. The operations must take into consideration several nonfederal plants, which are in series and hydraulically coupled with the federal plants. The program provides for the 17 plants that are existing, under construction or scheduled for early construction.



Streamflow studies of the 17 dams shown in the profile are "routine" with computer

The Computer Program

The computer program developed for making operation studies of this system is actually a model of the system with the characteristic curves for each plant stored in the magnetic drum memory. Suitable program logic allows the computer to combine a given streamflow for each plant with a given operation for each of the storage reservoirs to obtain a desired total generation or load. Input data are entered from the typewriter keyboard or from punched paper tape read through a photoelectric reader. The punched paper tape is prepared either by an auxiliary computer program or by an off-line flexowriter.

Time Saved

Virtually all of the operation studies for the system of plants shown in the profile illustration are now performed on the computer. In addition to this "bread and butter program," other programs have

been prepared for other operating problems such as streamflow forecasting procedures, statistical correlations and zonal wind velocity computation for weather forecasts.

An operating engineer can complete a study in less than half the time required with a desk calculator. In addition, the output is complete, readily understandable and of suitable quality to turn over to management for analysis.

The computer is used much the same as a desk calculator; however, the engineer is relieved of copying and re-entering intermediate answers, thus allowing him to devote his attention to analyzing the operation as the computation proceeds. In the event a change in operation is indicated, he needs only to halt the computation, enter the change from the typewriter, and in a few seconds the results of this change are typed out.

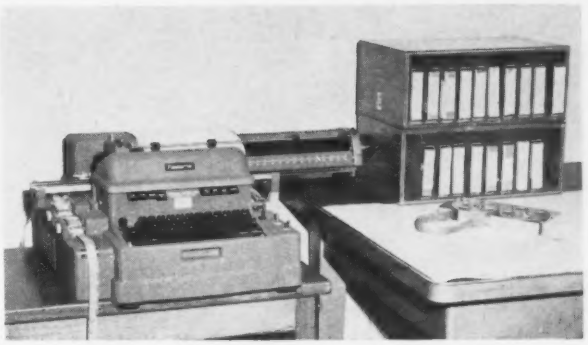
The Computer Organization

No formal computer section has been set up other than to assign one engineer to programming and one to maintenance. Maintenance requires only about 40% of the engineer's time, leaving him free to program and carry out operation studies. The power resources group has exclusive use of the computer and each engineer has been instructed in its operation and has free access to its use whenever he has a problem that fits an available program.

Two methods of programming, or coding, are used with the G-15A. Machine language programming is used for large problems, such as the operations problem, where large memory capacity is required. A simplified method of coding makes use of an intercom program, which reduces the computer to a single-address, serial-type computer with a given set of easy-to-learn instructions. We are currently encouraging all of our engineers to program their smaller problems using intercom and thus become more familiar with programming techniques.

Advantages of a Small Computer

The primary advantage of a small computer is its low cost. An additional advantage, although linked with low cost, is that it can be installed on a more or less open shop basis. For operating problems, ready accessibility to a computer (if one is to be used) is essential. Our present experience with a larger, higher speed computer indicates it could not be economically sustained on a readily accessible open shop basis.



Operating engineers have free access to the basic punched-tape programs in the magazines at right

Results

In addition to the ability to develop operation studies more rapidly, a very significant result has been obtained from the use of the G-15A —this is a better understanding of the system operation brought about by the forced detailing of each step of the problem necessary in developing a program. In utility operations it seems that many pertinent factors and operating limitations have a habit of becoming buried in the back of individual minds. In developing a program, these must be brought out and set down in an orderly manner, thus providing a better over-all understanding of the problem.

The introduction of the digital computer as a tool for the utility operating engineer has allowed greater exploration of operating problems. Most certainly advantage will be taken of the newer, larger and faster computers; however, the small computer will always be a stepping stone to a better understanding of basic problems and thus pave the way for the application of larger machines.

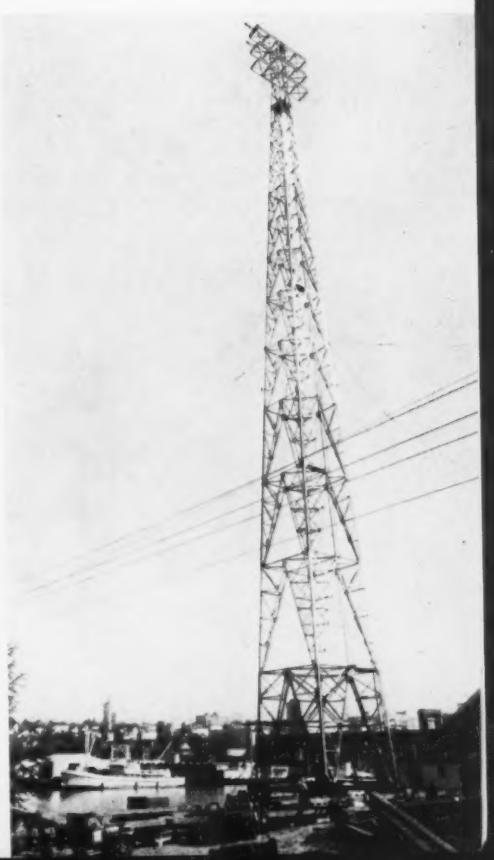
246-ft Tower Moved

In an unusual moving job, Seattle City Light moved the second of two 246½-ft-high transmission towers 100 ft to a new location. The towers were moved to make room for a new high-level bridge across the Lake Washington ship canal.

The towers, each weighing 45 tons, were raised off their foundations and moved on rollers over specially prepared cribbing trackways to the new locations. To enable the towers to travel over the rollers, the legs of each tower were connected with steel I-beams to which were fastened two 14x18-in. timber runners. The towers were guyed four ways with steel cable while being moved.

The transmission towers are used to carry Skagit River power at 115,000 v to the City Light Broad Street substation. They also carry three 26,000-v circuits. Power was routed to other lines while the crossing was out of service, a period of about two weeks.

Two smaller anchor towers, each 105 ft high and weighing 19 tons, were moved in one piece by a mobile crane. A fifth tower, 180 ft high, was removed.



CARIBOU NO. 2 POWER HOUSE—Going west along power house centerline are 250-ton portable crane on temporary crane-way and permanent 25-ton gantry crane. These facilities are designed for easy erection of the 250-ton crane by the 25-ton crane

Temporary cranes at three hydro sites . . .

Save 1.7% of Station Costs

C. H. Sedam, Manager of Station Construction, Pacific Gas and Electric Co.

Historically, full capacity crane facilities have been installed at Pacific Gas and Electric Co. hydroelectric plants for installation and subsequent rehandling of the heavier pieces of machinery. This practice has been considered sound economy at indoor plants because it has resulted from the provision of two bridge cranes at such a cost that there has been little incentive to embark upon a program involving temporary facilities.

Outdoor construction, however, presents somewhat different conditions for here cranes cannot be included as an integral part of the building superstructure and equivalent capacity must be provided by a gantry crane or by bridge cranes operating on a structural support, either of which results in a material increase in costs. This new condition led PG and E construction engineers to analyze the relative costs of temporary vs permanent full capacity equipment (see table) and the results have been quite gratifying.

The need for full capacity cranes for service other than their use on initial installation has been based on two principal considerations:

1. The requirement of doing ma-

jor maintenance on the generator rotors and main transformers, calling for removal and transportation of the equipment to a repair area provided in the power house, and

2. The possibility of emergency repairs to either the transformers or the generators.

PG and E experience indicates that the interval between installation and the necessity for such rehandling has averaged more than 20 years and also that there is a continuing trend toward doing such work in place rather than by removal of such components.

The use of temporary crane facilities has been PG and E practice for some time in steam plant construction, and the nature of outdoor hydro stations appeared to present another opportunity to adopt this practice for economical gain.

The scheme that evolved included the purchase of a permanent 25-ton gantry crane with the capability of controlled overloads up to approximately 35 tons, which would be sufficient for most of the construction activity as well as for later maintenance and overhaul work. Installation of major components was to be performed by temporary facilities, which would then be used in construction of other plants and would also be made available for future major repairs. This combination facility provided a material saving in capital expenditures such that a four-year continuing cycle of major overhaul would be required before the cost of temporary facilities would equal the cost of permanent cranes. If required for a major overhaul or modification, the heavy-duty crane would be set up in advance for the lifts. In the event of a failure requiring lifts on the heavy parts, the small crane would suffice for the partial dismantling while the heavy crane was being set up (about four days). A study of past failures indicated that shipment of windings and parts would most likely be the limiting factor—not the availability of cranes.

The accompanying pictures and captions illustrate the relationship of the temporary facilities to the permanent crane and show some of of the methods used in the initial hydro equipment installation. The photographs are from the PG and E hydroelectric construction on the Feather River.

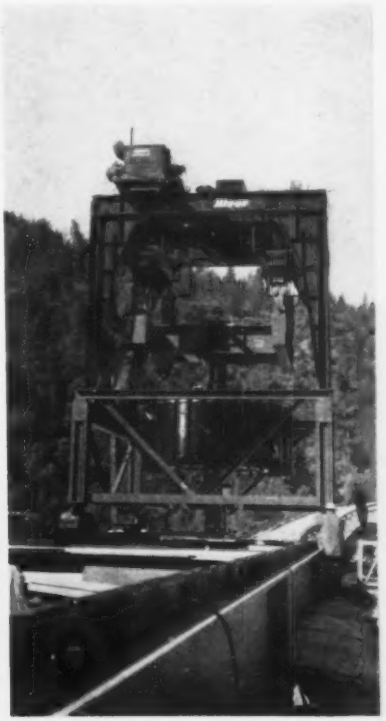
The detailed description of the method of handling all equipment in excess of the permanent crane capacity is as follows:

A structural steel frame supported primarily from the turbine foundation blocks was designed to carry a temporary crane runway over the center line of the units far enough above the deck to clear all obstructions. A light gantry framework mounted with two portable hoists, with the capability of 250 tons, was supplied to operate on this runway. This facility was provided to handle the stator sections and the rotors in the construction of the plant and will be available for like installation or future maintenance. This temporary runway extends out over the unloading area at the plant, as shown on the preceding page.

Cost Analysis

	Permanent 250-Ton Crane	Temporary 250-Ton Crane
Capital Costs		
Crane	$246,000	$ 90,150
Temporary runway and gantry frame and rental of 250-ton crane		63,997
Additional handling		6,940
Total	$246,000	$161,087
Capital saving using temporary crane (Poe PH)		84,913
Additional savings at Butt Valley PH		84,913
Additional savings at Caribou No. 2		108,000
Total saving three-plant group		$277,826
Savings as a percentage of three-station costs		1.7%

POE POWER HOUSE—The permanent 25-ton gantry aided by mobile crane completes erection of temporary 250-ton gantry crane. Right, temporary 250-ton gantry crane transports unit No. 1 rotor from the rotor erection pit to final location in generator



TOMORROW'S SUBSTATION features underground primary, low noise transformers, forest green painting and landscape gardening

City Light's appearance design proves . . .

Substations Are Good Neighbors

Leon A. Harman, Associate Engineer, Seattle City Light

In 1945, Seattle City Light management, in planning for future growth, changed from the use of large radial distribution substations to a primary distribution network system. At that time it was decided to use metal-clad unit substations for economic operation and to gain community acceptance. These stations were a marked improvement over the old open-type stations. However, as the number of stations increased and the area became more fully developed neighborhood protests against new units increased. The fact that Seattle had electric rates among the lowest in the nation and that it provided a high continuity of service did not console the future neighbor of a proposed substation.

I—Design Evolution

Improving the appearance of substations is a continual problem.

- Different types of shrubbery have been tried to camouflage the station without being too costly.
- The 4,360/2,520-v lines leading from the station were put underground leaving only the 26,400-v feeders overhead.
- Efforts were made to obtain less noisy transformers. The 6,000-kva power transformers received prior to 1952 had a sound level that resulted in "noisy transformer" complaints, even though they were within NEMA sound levels.
- In the mid-1950s, the subtransmission terminal tower was redesigned to be less objectionable. The photograph of Bryn Mawr substation depicts such a station. By 1957, 112 metal-clad-type unit substations had been installed throughout the service area, located about one per square mile. The ratings of these stations are: 26,400 - 4,360Y/2,520 v and are of 3,000, 5,000 and 6,000 kva capacity.

A New Zoning Ordinance came into being, which tended to upgrade the requirement level of residential districts. The City Planing Commission also began to exert more influence on the over-all appearance of distribution substations in residential areas. Early in 1958 application was made to install six unit substations in residential areas. Much opposition arose against these proposed installations. The neighbors of these substations were concerned about the adverse effect the substation would have on property values, mainly because of noise and appearance. As a result of these protests, the planning commission directed the lighting department to redesign its substations. The lighting department set to work to make whatever changes were necessary to overcome the mounting public opposition.

II—The New Look

A conference was held within the department to find ways to improve acceptance of substations in residential areas. Out of this conference came the following changes in the standard design for substations in residential areas.

- The 35-ft-high subtransmission line terminal tower will be eliminated, thus bringing this supply in underground to a side entrance oil-

TODAY'S BRYN MAWR sub, a trim design with underground feeders, metal-clad gear, in contrast to outdated sub below

filled terminal chamber on the transformer.

- The primary fuses and isolating disconnects formerly mounted on the tower will be placed on utility poles.
- The 7-ft security fence of the chain-link type will be replaced by a 4-ft decorative type. The substation equipment will be checked for hazardous conditions and any eliminated.
- The 5,000-kva transformers that will be purchased will have a sound level in the region of 58 to 62 db, approximately 7 db below NEMA standard.
- Unit substation equipment will be painted forest green color to be more compatible with the landscaping and neighborhood.
- Services of a landscape architect will be used in preparing a plan for the grounds around the substation. A rendering of the landscaped substation will be made when necessary to present more fully the proposed installation to the residents of the area and the planning commission.
- Education of the public as to the need for the substation and its site development will be presented to the neighborhood prior to the official notification. Use will be made of neighborhood newspapers and community clubs. By this method it is hoped that the public will be acquainted with the proposed installation, and thereby avoid unsatisfactory public reaction due primarily to lack of information.

All installations in residential areas for 1958 have been designed to this standard. For one site, Lucile substation, a model was prepared (to scale) by the landscape architect for better graphic presentation to the planning commission and residents of the area. The aim for this development was to create a neighborhood parklike atmosphere outside the fenced enclosure. Benches, night garden lighting, raised garden beds and brick patio are planned to promote this feeling. Minimum maintenance for this property is evident with all grass areas replaced by sculptured asphalt surfacing. The raised garden beds will be planted with ground cover and shrubs that need only occasional weeding once they are established.

Consideration was given to placing the substations in houselike enclosures and also the possibility of placing them completely underground. It was decided, however, that the extensive landscape treatment and removal of the steel tower would achieve the desired results.

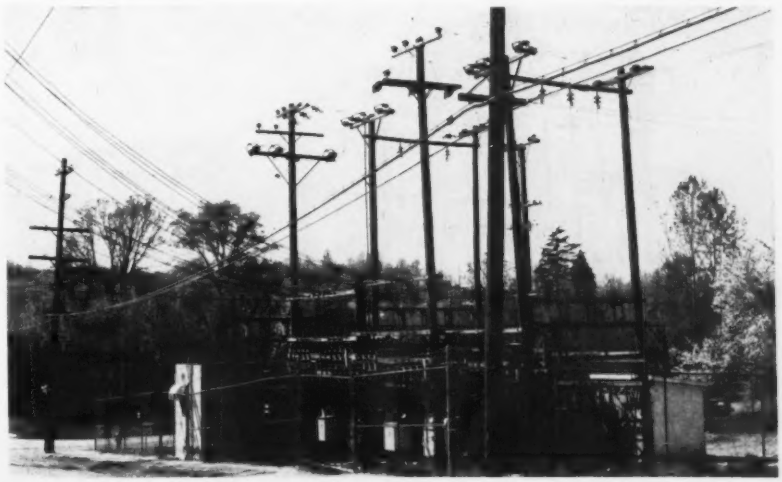
The other installations are not as elaborate as Lucile substation, although each one will be a credit to the neighborhood. They will show other residential areas what a substation will look like, if it becomes necessary to install one in their neighborhood.

III—The Price of Beauty

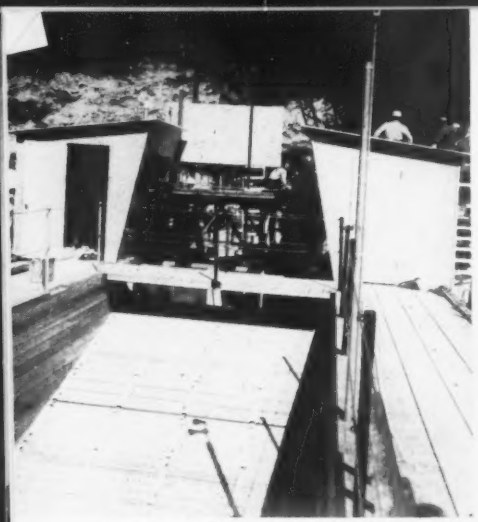
Landscaping costs have been running from ½% to 2% of the total substation investment. The new level of landscape treatment will range from 2 to 4% of the total investment. Removal of the tower, thus bringing the subtransmission line in underground, represents a percentage increase of about 5%. The total percentage cost increase for the new treatment of residential substations will, therefore, range from 7 to 9%.

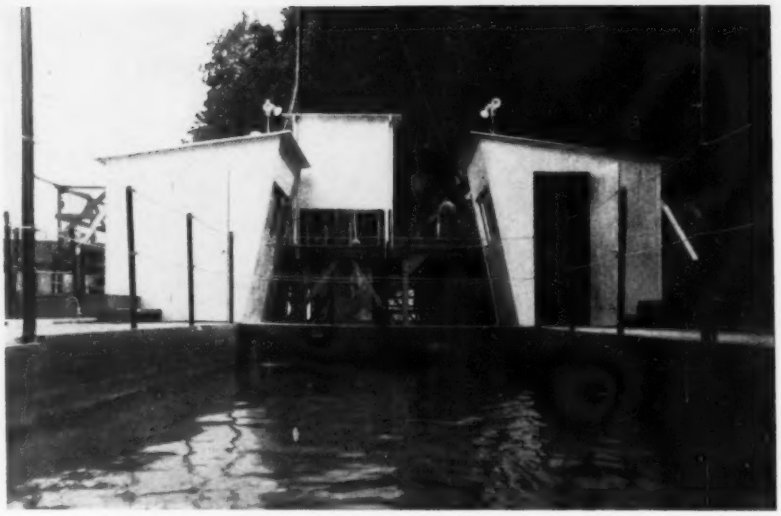
All of the improvements outlined above are now either in the design or construction stages. It is already apparent that the effort to improve substation acceptance will be rewarded. The City Planning Commission, which only a few weeks before had held up approval of a permit for a substation, complimented City Light on its revised plans. The neighboring residents withdrew their protests. One of the local dailies headlined the news article "New City Light Transformer Stations to Be Attractive," and in its editorial columns five days later carried an editorial entitled "Fostering 'City-Beautiful' Plans."

"Seattle's city-beautification program receives impetus through plans of City Light to improve the appearance of transformer substations to be built in residential neighborhoods," it said. "This is a commendable objective, though transforming a transformer into a thing of beauty may turn out to be no mean feat."



LONG GONE are the days of the piecemeal sub where only electrical considerations made demands on the station designer





Louvers in foreground (above) guide fish upward and into a collection system. At right is the same facility with artificially forced water going toward the catch tank

Big Doings for Little Fish

A multimillion dollar question that must be answered for the tremendous hydroelectric complex of the Pacific Northwest and California is: "Are we providing the best possible means of getting baby fish past the big dams on their way to the ocean?"

With years of costly research behind them, the experts still cannot say that they have the answer, but at least one principle stands out enough to make multimillion dollar investments seem worth-while. It is the use of floating skimmers (or floating traps) that attract the baby fish with artificial currents. Outstanding in applications of these devices are those at Brownlee Dam of Idaho Power Co. and Baker Dam of Puget Sound Power & Light Co.

In operation, the floating traps have strong pumps that set up a current in the placid pool above a dam. The current attracts the baby fish by simulating an exit otherwise provided by a spillway. They swim up an inclined set of louvers through which most of the water (but not the fish) is returned to the reservoir. The fish are collected in a tank and released again below the dam.

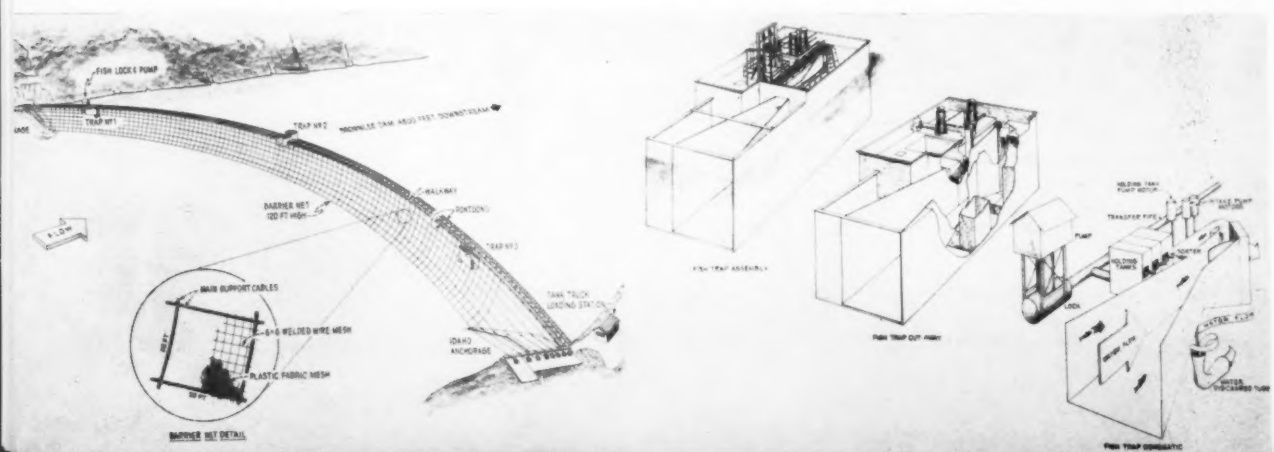
Floating traps described in the preceding paragraph are at Baker Dam under test. Traps at Brownlee are not exactly the same, but the fundamental of using artificial current is the same. The Brownlee traps, since they are installed permanently, are used in conjunction with a huge plastic, wire mesh and cable barrier extending 2,800 ft in a sweeping downstream curve across the reservoir. It reaches a depth of 120 ft. Three fish traps are located along the barrier.

Also in use at Brownlee are rubber transfer lines through which fish are "piped" to a truck loading station for the trip below the dam. Similar transfer methods can and will be used with the Baker Dam unit when it becomes part of a permanent installation.

Credit for the wealth of data and practical experience that has been accumulated must be given to the U. S. Fish & Wildlife Service, the fish and game agencies of Idaho, Oregon and Washington, and to virtually every major utility in the Pacific Northwest.

The cost? It is tremendous. Idaho Power, for example, spent $250,000 for federal and state studies alone. Add to this another $90,000 spent

At left (below) is a schematic layout of the Brownlee barrier, with traps. At right are breakdown drawings of traps



Analytical biologists check scrap fish specimens in picture above. WWP's Tim Vaughan is in center of group at right. Far right is Walter Johnson, WWP hydrologist. Man at left is unidentified

for studies under its own sponsorship. Puget Power, too, has borne all the construction, laboratory and operation costs on the units under test at Baker Dam. The effort has been, for the most part, a combination of utility money and fish and game agencies' experience.

Stream Rehabilitation Tried

Washington Water Power Co., with $100,000 and the cooperation of the Montana Department of Fish & Game, is conducting an interesting experiment in improving things for game fish behind Noxon Rapids Dam on the Clark Fork River.

After several years of studies by the State of Montana and WWP, it was decided to treat the reservoir area with a toxicant to remove the existing scrap fish and to restock it with about 800,000 rainbow trout a year for three consecutive years.

Treating of lakes with fish toxicants has been done for a number of years, but never before on a river the size of Clark Fork, which has a minimum flow of 5,000 cfs.

Tim Vaughan, WWP fish biologist, and John Gaffney and Frank Stefanich, fishery biologists for the Montana Department of Fish & Game, directed the activities of more than 50 men who placed 12½ tons of toxicant in the river on Labor Day. Montana Power Co. cooperated with the project by shutting down its Thompson Falls run off to reduce river flow during the treatment.

As a result of the treatment, scrap fish—squawfish, chubs and suckers—in large numbers were removed.

As you read this, the Clark Fork River is probably rapidly becoming a fisherman's paradise, because the experts believe that by giving the rainbow trout a "clean start" in the river these fish will be able to hold their own against possible future infestation by scrapfish from upstream.

Saving a Fish Industry

Saving a fish industry with a total annual value of more than $30,000,000 was the problem of the Bureau of Reclamation in California, when it became obvious that baby fish were attracted to the pumps of Tracy pumping plant in the Delta-Mendota Canal unit of the California Central Valley Project.

Peat moss, tule fragments and other debris, flowing through the water in great quantities and at the rate of 5,000 cps, created a problem for the bureau because fish as small as one inch in length had to be separated from it. Russell Vinsonhaler of the bureau, and Daniel W. Bates and George O. Black of the Federal Fish & Wildlife Service, are credited with designing the ingenious system of louvers that does the job.

Costing some $2,000,000, the system of louvers looks like a huge venetian blind—320 ft long and 25 ft high—set on edge diagonally in the pump intake channel, with the slats open. There is also a secondary structure. Because of a turbulence between the slats of the louvers, the fish are kept away and are guided along them instead of through them. Clean, screened water is fed into the system along the outside wall of one of the louver structures. It enters the by-pass ahead of the mossy water and the fish cross over into clean water at that point.

After passing through the secondary louvers, they are piped into four 20-ft diameter holding tanks, and from there they are transferred to a truck that takes them downstream.

The combination of the debris and the strong current prevented the use of conventional fish screens.

During the three-month heavy pumping season, the system saved nearly 7,500,000 fish.

Bureau engineers are careful to caution that one application where the louver system will not work is on a stream where there is a heavy volume of tree leaves. The leaves get hung up on the louvers.

These are only a few of the many fish saving methods under study or in use. But they serve to illustrate the tremendous effort that is being made to save a valuable industry.

This louver structure separates fish from debris at the Delta-Mendota Canal in California

Disagreement lights on the dispatcher's console and the diagram board alert the dispatcher that breaker position has changed

One of the West's most automatic systems,

here is a look at B. C. Electric's . . .

System Operation Center

J. E. Underhill, Staff Engineer, B. C. Engineering Co. Ltd.

When the B. C. Electric Co. moved into its new ofice building provision was made for a new system operations headquarters. The system operations headquarters consists of a load dispatching office adjoining a supervisory control center. This headquarters controls the B. C. Electric mainland system consisting of 10 hydro stations with a total capacity of 760,000 kw. It controls the power flow on the B. C. Electric mainland system, the flow to the Northwest Power Pool, as well as the power flow over the 132-kv submarine cable to the interconnected B. C. Electric and B. C. Power Commission systems on Vancouver Island. The B. C. Electric Vancouver Island system is separately controlled in Victoria.

Four of the existing hydro stations are controlled by manual operation, but the remaining six are unattended and operated by supervisory control. All 20 major substations are also operated by supervisory control. Sixteen smaller substations are equipped with radio controls that provide limited control and alarm features.

Growth Brings Automation

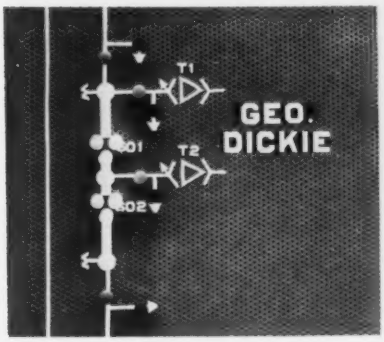
The dynamic growth of the B. C. Electric system in the past decade has accentuated the importance of effective economic load dispatching.

To exercise the necessary control functions, all modern methods of communications are employed to bring vital and sufficient information to the dispatchers. Supervisory control and telemetering channels along with voice communication are provided from the system operations headquarters to each station by means of one or a combination of micro-wave channels, power line carrier current channels, tone equipment channels, leased telephone cables or company owned and installed telephone cables. To meet emergencies, voice communications are backed up by fixed radio station installations, either VHF or MF depending on the distance involved.

While the operators at the manual stations communicate with the dispatchers by telephone or radio, the total output of the generators at each station is telemetered to megawatt recorders in the load dispatch office.

Essential information regarding the supervisory controlled stations is constantly available to the supervisory control operators and is augmented by means of selective telemetering equipment. As with the manually operated generating stations, generation is individually telemetered to megawatt recorders in the load dispatch office.

The supervisory control center is arranged in two horseshoe groups of cubicles. The supervisory control section is separated from the load dispatch office by a glass partition that enables the operating personnel to see each other without the dispatchers being distracted by super-



Close-up of the three-element lamp units used on system diagram board. Right, supervisory control cubicles separated from dispatchers by glass wall

visory alarms and other signals. Information necessary for the load dispatching function is reported over an intercom system.

The information required by the load dispatchers is visually portrayed on the recording instrument panels and the system diagram board. The latter is carefully posted from the dispatchers' console so that the dispatchers are constantly aware of the position of each circuit breaker, which is represented by a three-element lamp unit and what equipment and circuits are in service.

When a circuit breaker changes position from that shown by the semaphore bar on the console, contacts in a supervisory control cubicle will simultaneously energize the corresponding white "disagreement" lamps on the console *and* the system diagram board. The dispatcher may then check with the supervisory control operator as to whether or not a switching operation or protective relay trip out of this circuit breaker did actually occur and, after being satisfied, post the correct circuit breaker position on the console and the system diagram board. When the semaphore switch and lamp unit is made to agree with the circuit breaker position indicated by the supervisory control equipment, the white disagreement lamps will be extinguished.

With the equipment described, the dispatchers are kept constantly aware of the changes continually occurring on the system. By coordinating this information with the special daily orders given them by the electrical operating division supervisors, the dispatchers can exercise their duties to best advantage. In the event of fault conditions, the visual portrayal of the information makes it easy to issue the necessary switching orders to restore the system to normal.

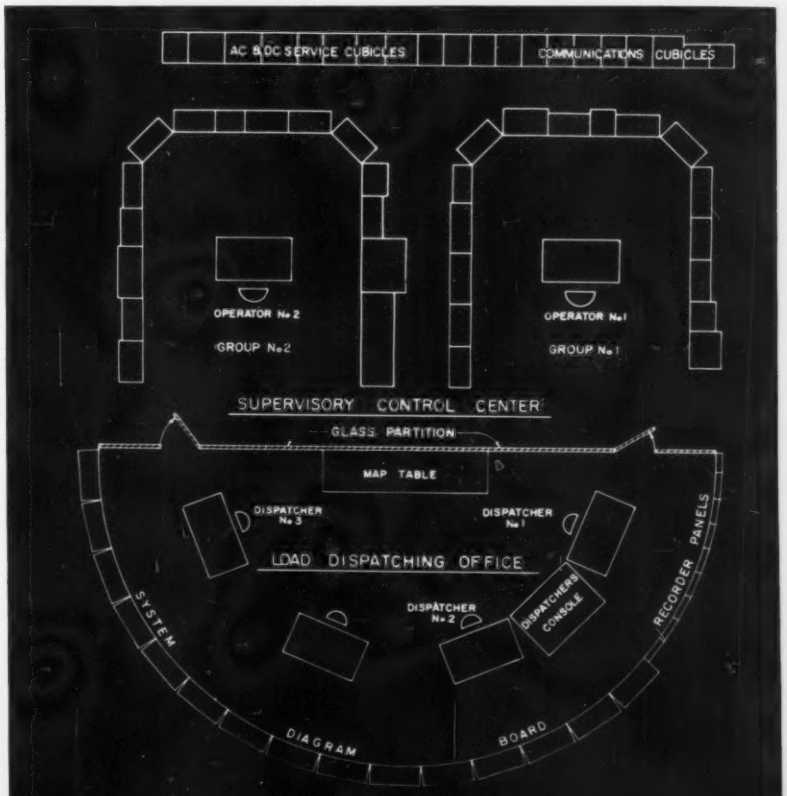
The dispatchers issue verbal orders by telephone or radio to the operators at the manually controlled stations and over the intercom system to the supervisory control operators.

Three 24-hour tape recorders monitor all orders given and reports received by the dispatchers. Following a system disturbance, it is possible to review their performance with an eye toward improvement in both method and speed of restoring service.

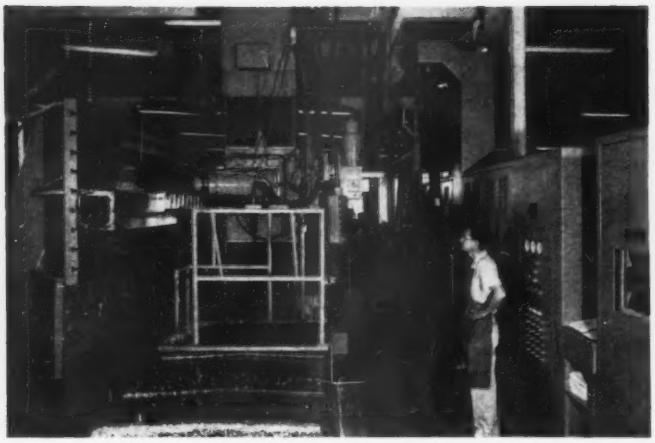
Engineering of the facilities described in this article were undertaken for B. C. Electric Co. Ltd. by B. C. Engineering Co. Ltd. of Vancouver.

Automatic System Proved During Strike

During the period of the strike, which lasted from March 3 to 27, the electrical system was operated with no inconvenience to the public. The high degree of automation of the system resulted in minimum attention being required to station and substation operation, so that the supervisory staff was able to concentrate its forces on maintenance problems. The reliability of automatic control was thoroughly proved during this period.



Floor plan shows how dispatching and supervisory control functions are visually connected, but soundproofed to avoid unnecessary distractions



The operator just pushes the button and stands by to supervise operations on the tape-controlled milling machine shown

Production Record Set by Control

Aircraft production and installation records have been shattered at Lockheed Aircraft's Burbank, Calif., plant by a new tape-controlled milling machine.

Completely installed and tested in six weeks, the multiple axes profile milling machine, developed by Giddings & Lewis Machine Tool Co. and equipped with an electronic control system designed by General Electric, is bettering existing production records by as much as 75%.

Savings Are Sizable

Believed to be the first such machine ever designed specifically to operate from an automatic magnetic tape control system called Numericord, it has effected savings from 75% to 90% on some complex parts.

Dr. L. H. Ferrish, Lockheed's coordinator of numerical control, pointed out that "only a vacuum tube voltmeter is needed to service the system. After four months of continuous operation only two minimum-time work stoppages—to replace two tubes—were required, indicating that the system is practically trouble free."

This mill is presently being used to produce major parts for Lockheed's F-104 jet Starfighter. When run at full capacity, the mill will make a series of major parts, resulting in an over-all reduction of twenty-one days in production time, from the original engineering to the final magnetic tape. Production runs made after the original design has been completed will result in a still further time reduction.

In what is believed to be the first cost study ever made of aircraft parts produced by this method, a 69% saving on two lots totalling 164 pieces was noted the first time that part was produced. On an 85-piece single lot, a 61% saving was recorded.

One part, originally costing $69.50, is now being machined for about $15.70, including a few operations subsequent to those performed on the numerically controlled profiler. Cost of producing a second part was reduced from around $40.35 to approximately $14.30, again including some machining operations subsequent to those on the numerically controlled profiler.

A lower rejection rate of parts produced on the G&L mill, resulting from high accuracy capabilities of the numerical control system, will produce further time and cost savings, according to Dr. Ferrish.

Spar and skin mill cams up to 12 ft in length have been machined on the numerically controlled mill to accuracies of plus-minus .0005 to plus-minus .001 inch, where similar tools fabricated in the tool shop averaged plus-minus .005 inch. "For this reason," Dr. Ferrish reports, "closer engineering tolerance on future spar and skin designs can be expected to result in a considerable weight saving on large aircraft. Stock up to 14 ft long and 4 ft high can be readily handled by the mill.

Both mill and control are specically designed to reduce lengthy tool change and setup time and to eliminate the need for specially made cutting tools and templates. Signals specifying machine positions (200 times per second), cutting tool changes, and special operating instructions are recorded on 14-channel magnetic tape. Using these recorded signals, the control continuously and automatically operates each machine feed motion, plus a variety of auxiliary functions.

Operator's Functions

The operator's functions in this all-automatic profile mill consist of setting the machine and pushing the start button. From that point on he acts in a supervisory capacity until the machine runs automatically to completion. The only time he stops the machine is to change cutting tools.

An additional use for this numerically controlled equipment is the function of a tool shop machine in the fabrication of templates, cams and die sinkings with increased accuracy, reduced lead time, shorter fabrication span, and at a lower cost than with present techniques. Application of the system is growing.

Boise X-ray House Bares Wiring

CALLED an "X-ray Medallion Home" because its "innards" showed, a model home displayed at Boise Valley Electric Home Show in June made a better effort in showing wiring than usually happens in model home shows. Covered over by the walls, most home shows can only talk about the wiring but this one actually showed it in all but the one finished living room.

The Boise X-ray Medallion Home was built of precut sections in four days more or less in stages. There were 26 electrical contractors who participated in sponsoring and wiring the home. Suppliers furnished equipment and appliances that were put in their respective places but not wired in.

Featured was a 200-amp service entrance panel. All of the wiring was exposed, except in the living room, in order that visitors could have the complete electrical system in its mechanical and functional aspects explained to them. Lighting fixtures were installed at outlet boxes affixed to the open studding as in roughed-in wiring.

In the kitchen and utility areas the built-in cook top and oven were located where they normally would be installed but were supported on tables. The ventilating hood was suspended by wires from the ceiling studs.

More than 14,000 people entered the home through the bare studded hallway. They passed a bathroom in which the fixtures were located and through bedrooms where insulation was partially installed in walls and ceiling. The kitchen and utility area only had the appliances in the open against open studded walls. Only the living room was completely finished, furnished and decorated. Exterior landscaping was done by means of potted plants, a temporary simulated pool, etc.

The home was manned by builder representatives, electrical contractors, Idaho Power Co. salesmen and demonstrators and a receptionist who passed out literature and registration cards. Frank Mitchel, Union Electric Co., was chairman of the contractor group responsible for the electrical features.

Wiring exposed in the studs, appliances merely placed about where they would be

Wrap-around Adds New Facility

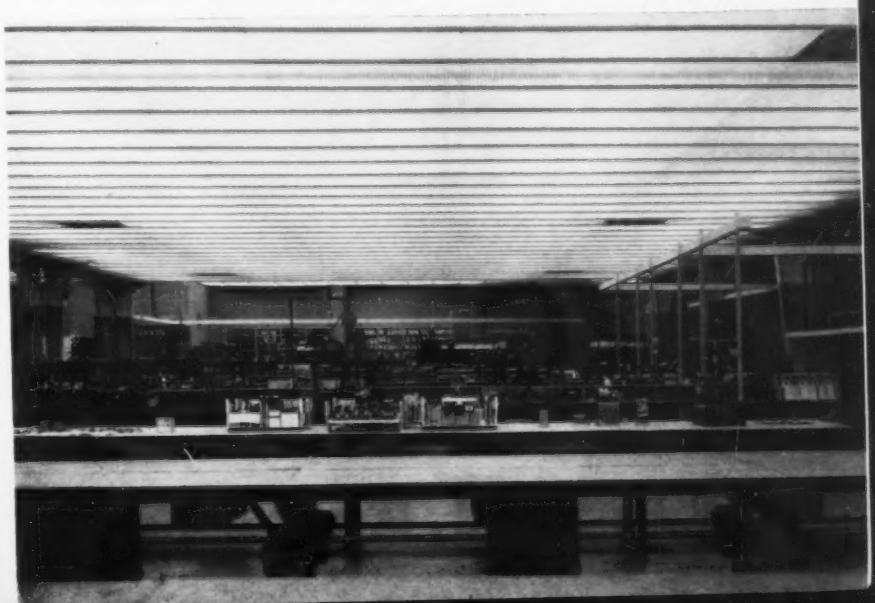
(From V. H. Lind, Industrial Power Engineer, PG and E, San Jose)

A NOVEL modernization and expansion program was done by Lenkurt Electric Corp. at San Carlos, by wrapping a new 40,000-sq-ft tilt-up concrete building completely around the existing four 10,000-sq-ft steel buildings that were side by side, making a total of 80,000 sq ft. This was done without interrupting the assembly operations. The new roof in the wrap-around section was tied to the existing roofs.

Lenkurt manufactures telephone equipment for private companies, and much of its work involves seeing of fine detail, such as winding, installing and terminating of small induction coils wound with fine wire. The existing bare lamp slimline lighting installation was inadequate. So the company had installed, as an important part of its modernization, a Sylvalume luminous ceiling providing approximately 85 f-c at bench level throughout. High levels are attained with low brightness and excellent diffusion.

Results in maintaining speed and quality of production for both office and assembly line are excellent.

Entire assembly and office area of 80,000 sq ft now covered by a luminous ceiling



What Price Fluorescent?

What has been the experience with fluorescent street lighting in San Leandro, Calif.? After a year of operation, the installation described in ELECTRICAL WEST in January 1957, p 100, by Henry M. Tilson, consulting engineer, and Ernest L. Nelson, chief electrical inspector for the city of San Leandro, the latter has furnished the accompanying tabulation of the expenses incurred for the operation of the system from the period Oct. 4, 1956, until July 1, 1958.

In commenting upon these figures Tilson makes the following observations:

"As you can see, some of the costs apply to the conduit and wiring and would have been incurred for any system which might have been installed. Also to be considered are the improvements in the fluorescent tubes which have been made since the original tubes were manufactured, particularly as they affect the life of the tubes. These figures also show the advantages of group replacement of lamps as they apply to street lighting.

"You will note that the figures given for group replacement include the cleaning of the plastic enclosures and the polishing of the reflectors. As San Leandro is located on the Bay of San Francisco, the reflectors are affected by the salt in the air which is characteristic of coastal areas and which would not be a factor in inland areas.

"When the installation was made the utility did not have any published schedule applicable to multiple fluorescent units and it was neccesary to bill the energy under a commercial lighting schedule. It has recently adopted a new schedule for this type of lighting amounting to $3.58 per unit of four 100-w lamps per fixture per month, for energy only where the city owns and maintains the system. It will also supply switching for $3.75 per month but if the city furnishes the switching there will be a service charge of $1.25 per month. This compares favorably with a charge of $3.50 per month per lamp for mercury-vapor units under similar conditions.

"Approximately 75% of the tube replacements occurred after January 1958. Of the remaining 25% some 50% were replaced shortly after the original installation. If these tubes were replaced under the lamp guarantees there would be a small reduction in the tube costs, which has not been reflected in the tabulation. For the tubes as manufactured in 1956 the replacements were made at very nearly the proper time, labor costs considered. Short time replacements were identified and these tubes retained for interim replacements. The elapsed burning time figures were approximately 7,300 hours.

"The city of San Leandro is so well satisfied with the results obtained from the original installation that there are two additional lighting districts in process of formation which will result in more than doubling the area being lighted with fluorescent lights."

Downtown San Leandro fluorescent units

Operating and Maintenance Costs

Summary of Work
Fluorescent Street Lighting
San Leandro, Calif.
Oct. 4, 1956, to July 1, 1958

102½ units installed and energized 10/4/56—total of 410 tubes
2 ½ units installed at City Hall 7/1/57
2 ½ units installed at City Hall 9/20/57
Total poles remain at 102—total units at 104½ = 418 tubes
70 tubes changed throughout the period 10/4/56 to 7/1/58

31 man-hours used in replacements:

$$\frac{\text{70 replacements}}{\text{410 units origin}} = 17\% \text{ replacement during the period}$$

$$\frac{\text{31 man-hours}}{\text{70 tubes}} = .442 \times 60 \text{ min.} — 26.5 \text{ min./per tube}$$

Group replaced all tubes, cleaned reflector and glassware during June 1958
418 tubes—107 man-hours

$$\frac{107}{418} — .255 \times 60 = 15.3 \text{ min./per tube}$$

107 man-hours at $2.73 per hr.	$292.11	
418 lamps at $292.11	0.6985	per tube
31 man-hours at $2.73 per m-h	84.63	
70 tubes at $84.63	1.209	per tube

100-w tubes at 4.50 each less 50% .... $2.25 per tube
$2.25 per tube plus 0.70 labor ..... 2.95 per tube group replacement cost
$2.25 per tube plus 1.21 labor ..... 3.46 per tube interim replacement cost

Total Replacement Costs

70 units at $3.46 per tube	$ 242.50
418 units at $2.95 each	1,233.10
	$1,475.30

$1,475.30/418 ..... $ 3.53 replacement cost per tube
$3.53 x 4 tubes .... 14.12 per standard

100-amp CB changed to 150-amp current coil installation with No. 2 feed	24	man-hours
Ground testing and current readings	10	hours total
3 conduit damages—street construction	24	man-hours
1 socket change—faulty tube installation	1.5	man-hours
2 ballast replacements	4	man-hours
Installed 4 additional fixtures (delta installation)	16	man-hours
Lowered and raised one pole to make connections (street repair), 1½ hr with use of boom truck	3	man-hours

ELECTRICAL WEST
Construction News

For
- contractors
- consulting engineers
- lighting engineers
- wiring designers
- distributor salesmen
- all interested

Don Larson, one of NECA's first qualified chapter managers, resigned as manager of the Rocky Mountain Chapter, National Electrical Contractors Assn., Denver. Larson, an attorney and operator of a group of chain stores, had both the legal and the business background that enabled his direction of the chapter from its reorganization about 15 years ago to its present eminence.

John W. Hecht (Fig. 1) has been appointed manager and secretary of the Rocky Mountain Chapter, NECA, succeeding Larson. Hecht has been assistant business manager of Local 16, IBEW, Denver. He began work in the industry in 1941. He became instructor in apprenticeship in 1954 and assistant business manager in 1956.

1

Denver's revised electrical code has been delayed in adoption by the Denver City Council at the behest of the Denver Home Builders Assn., which requested more time to study its details. Don Harter, chief building inspector, and electrical industry representatives have been working for the past two years on proposed revisions based on the 1956 National Electrical Code. Principal difference is a restriction of the use of nonmetallic sheath cable to one- and two-family dwellings. Denver originally had an all-metal code. The new code proposed would require metal conduits to carry wiring in all construction except one- and two-family residences as well as heavier circuits.

Codes revised

Phoenix is likewise considering a new electrical code, one that will attract and retain industry and yet maintain good standards of safety. One interesting provision is that firms regularly employing one or more competent electricians could pay a $75 annual permit to do their own maintenance and alterations. This would be for such companies as make frequent changes in their mechanical equipment to meet production changes. Under present code requirements a separate permit and inspection for each change is required. Another provision would be that existing open wiring not in conduit in sizes 4/0 and larger could only alter and extend such systems in present buildings but new buildings would require conduit wiring. Definitions of competent maintenance personnel will be clarified.

More staff

Los Angeles Chapter, NECA, has added two new staff members. Robert K. Kelley, former executive secretary, California Board of Architectural Examiners, becomes liaison between management and labor for the NECA-sponsored apprenticeship program. Thomas W. Powers, Washington, D.C., a recent graduate of Notre Dame, is joining the staff as field representative. Approximately 45 contractors and their wives from the chapter formed the delegation to the national convenion in Dallas, chartering half of a large airliner.

"What to Do When a Revenue Agent Calls for an Appointment" was the magnet that drew a large attendance of electrical contractors from Northern California Chapter, NECA, to a one-day seminar on taxation held at Oakland Chamber of Commerce Nov. 13. Contracting used to be a simple business. If the wages and fringes don't get you, the revenuers will.

Branch office

A suboffice in Contra Costa County has finally been decided upon by the board of directors of the Northern California Chapter, NECA. The office will serve Contra Costa County branch and the Solano-Napa Counties branch and be under the general supervision of Assistant Manager Larry Rodgers. Services that can be most efficiently operated out of the central office in Oakland will be continued there, Ernest Kramm, manager, has announced.

A house-heating clinic for electrical contractors of Pueblo, Colo., was conducted under the auspices of the Colorado Farm Power Council recently. Similar meetings were held in Trinidad and La Junta. Instructors were E. H. Pemberton, Charles Bell, Robert Even and Carl Balsick of Southern Colorado Power Co.

2

With a Mylar rope only 3/8 in. in diameter R. C. Electric Co. of Redwood City, Calif., easily pulled four 500,000-cir-mil cables through a 162-ft, 4-in. conduit containing one 90° bend and two offsets. Ernie Canete, president of R. C. Electric, found that the Mylar rope, twice as strong as corresponding fiber rope, had no stretch and did not damage the conduit as a metal rope might do. The rope is made by U. S. Plastic Rope Inc. of Redwood City (Fig. 2.)

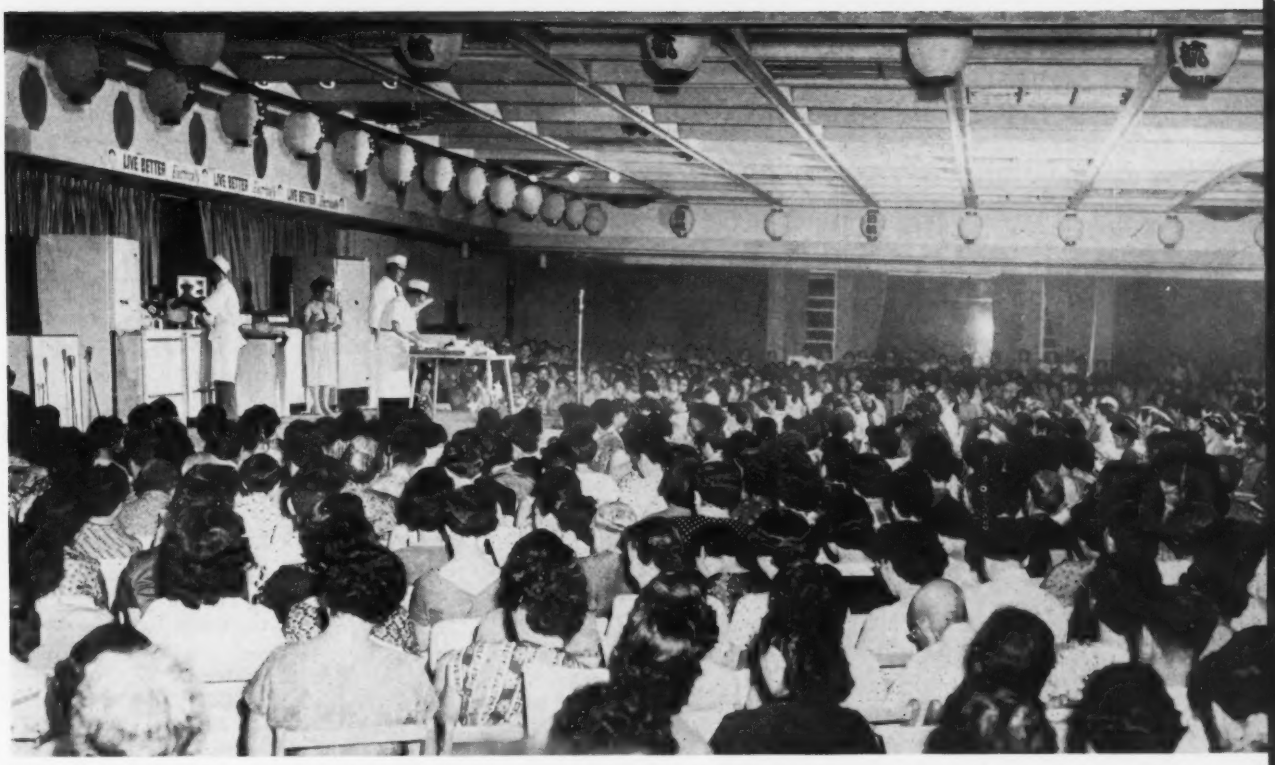
All-Brite and Fluorescent Fixtures of California may have been one and the same but now the name will be simplified to All-Brite Fluorescent Fixtures Inc., according to E. O. Anders, chairman of the board. Distribution of the California company's fixtures is also extending into the eastern markets.

Electrical contractors are completing a number of big power projects for utilities of the West. Five power plants on the Feather River will be to the credit of Wismer & Becker, Sacramento contractor, who likewise has recently taken on a contract for a big power project in connection with Niagara Falls. The Balch power plant of PG and E started up its first generator Nov. 12. This was installed by Abbett Electric Co. of San Francisco. Collins Electric Co. of Stockton recently was awarded a contract for the Cherry power plant of the city of San Francisco.

A minimum of one foot-candle of light at a level five feet from the floor will be required by Salt Lake City in all premises licensed to sell beer, the city commission recently ruled. This should provide some business for the city's electrical contractors.

New ordinance

A new county ordinance has been passed in San Joaquin County which features a 100-amp service requirement for houses of 900 sq ft and over and extends the jurisdiction to 10-acre minimum farm sites as well as equalizing the fees. The ordinance has been developed under the leadership of Frank Catelli, supervising electrical inspector, and Gilman O'Neil, chief of the county building department, with the aid of local industry.



More than 6,000 turned out to the all-electric cooking school conducted in English and Japanese by Shosaburo Mita, famed chef

Survey showed that electric story was not reaching non-English speaking residents and so . . .

HECO Spoke Their Language

To get around a language barrier that was keeping the electric cooking story from Hawaii's Japanese-speaking residents, Hawaiian Electric Co. staged a Live Better . . . With Denki* cooking school in cooperation with the *Times*, a local newspaper featuring news and advertising in both the English and Japanese languages. Following the Honolulu school, sessions were held in Hilo and Wailuku, sponsored by the newspaper with Hilo Electric and Maui Electric companies. Local distributors participated.

Following a utility merchandising study, showing that its promotional efforts were not getting through to many older customers of Japanese ancestry, HECO made arrangements with the *Times* and Shosaburo Mita, a top Japanese restauranteur and culinary expert, was invited to the Islands to conduct the school.

Then the problems started. First, several months were required to get clearance from the Japanese Embassy in Tokyo. Then, when Mr. Mita arrived in Honolulu, it was found that he spoke no English and had never used an electric range!

The attractive program reproduced the menus in English and Japanese, carried advertising and messages from the sponsors

Accordingly an interpreter was provided and Japanese-speaking home economists from the utility schooled him in the electric sales story and use of the range.

Publicity and advertising started about three weeks before the opening date and the first of three meetings crowded more than 2,000 people into the Princess Kaiulani meeting room designed for 1,200. Additional sound equipment was installed on the outside lanais to take the program to the people watching through large windows. When the three sessions were over, some 6,000 had attended the three-hour demonstration and sales presentation. The older Japanese women at whom the program was beamed turned out in large numbers.

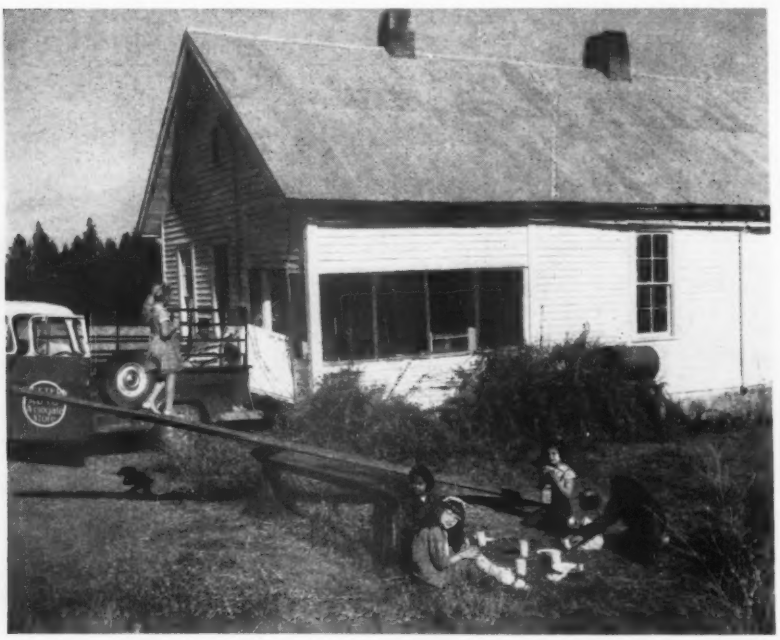
The school was conducted in Japanese with English commentary. A 28-page program in English and Japanese gave the menus and carried advertising and messages.

*Denki is Japanese for electricity.

Although Holiday House, shown at the Los Angeles Decorators Show in October, is little larger than a two-car garage, it has electrical conveniences to qualify it for the Gold Medallion Award. In addition to the all-electric kitchen shown, it has a heat pump for complete air conditioning. Input and exhaust ducts were placed within the wall cabinet that houses books, guns and fishing rods. Holiday House was designed by Ralph and Jane Bonnell and was displayed through the sponsorship of Southern California Edison Co. and the Los Angeles Department of Water & Power

Yule Lighting

Again this year the industry is cooperating with newspapers and civic groups in encouraging outdoor Christmas decorations. Typical is the program of the Outdoor Christmas Tree Assn. in the San Francisco Bay area in which the Northern California Electrical Bureau joins other groups. As a part of this endeavor the *San Francisco Examiner* offers prizes for original designs. The cover picture, a top winner in the 1957 competition, shows a scene on the lawn of an El Cerrito home.



Children at Rogers Bar school eat lunch as their first electric range is unloaded

Farms Hooked Up

Thirty-two farm families in Ferry County, Wash., about 30 airline miles from Grand Coulee Dam, recently celebrated the arrival of their first electric power service, brought in by Washington Water Power Co.

Some 80 people, representing every family in the community, staged a potluck dinner at the Rogers Bar school, one of the first buildings to receive electric service.

Washington Water Power reports that appliance dealers at Colville and Kettle Falls had a heavy demand from the new users for a whole list of electric appliances, including ranges, refrigerators, water heaters and television. Part of the program at the celebration dinner was an instruction course in operation and maintenance of TV sets.

Kitchen Modernization Can Be Profitable

Brown Johnston, an appliance dealer in Spokane for 61 years but a newcomer to kitchen modernization, is proving that this operation can be profitable if properly managed. The company got into the business last May and in October had sold about 34 modernization jobs, averaging from $3,200 to $3,300 each, that is, without the latest contract, a de luxe job. Financing help is offered but there have been few takers. Charles R. "Chuck" Nelson, however, has laid down some ground rules that he is convinced are essential to a successful operation.

1. Go in all the way. Subcontract where necessary. Make a firm bid on the entire job.
2. Give detailed specifications so that the customer knows what he is getting but do not break down the quotation.
3. Don't let out the plans until the job has been sold.
4. Be sure that the subcontractors make money on your job.

The company advertises by direct mail, has run two newspaper ads, one full page and one half page. This fall it plans to use radio.

Two people work full time on this phase of the business. Bysymmetric drawings are provided to show the planned kitchen in three-dimensional color. A full documentary is kept, including before and after pictures.

Brown Johnston has four model kitchens in 70 ft of display space. These kitchens are complete, including lighting. That way the salesmen can bring a customer in and sell him, according to Nelson.

Since about 90% of the dissatisfaction with old homes is in the kitchen, Nelson believes modernization is a good business.

Who's Minding The Store?

. . . in the magazine publishing business, it's

The Audit Bureau of Circulations (ABC) is a cooperative organization that sets standards of good business conduct for its publisher members. Once each year ABC auditors carefully scrutinize the entire circulation structure and operation of every member magazine. In a very real sense, therefore, they are "minding the store" — making sure that no false or misleading claims are made regarding the size or composition of a magazine's audience.

McGraw-Hill is a charter member of ABC and has supported its aims continuously for over 40 years. We believe this membership serves you by providing full assurance that every subscriber to McGraw-Hill magazines displaying the ABC symbol is paying to receive his copies.

Accurate Figures — about you are the heart of ABC's job. ABC does a candid, unbiased, certified audit of all subscription figures of member magazines — and of the subscribers' jobs, functions, and locations. These audits help editors to tailor the contents of their magazine to your specific job interests.

You're the boss when you pay money for any magazine. Your vote of confidence and your renewals of subscriptions are dominant in the thinking of editors and publishers. Advertisers are vitally interested, too, and their support helps earn the dollars needed to do a stronger, more useful editorial job for you.

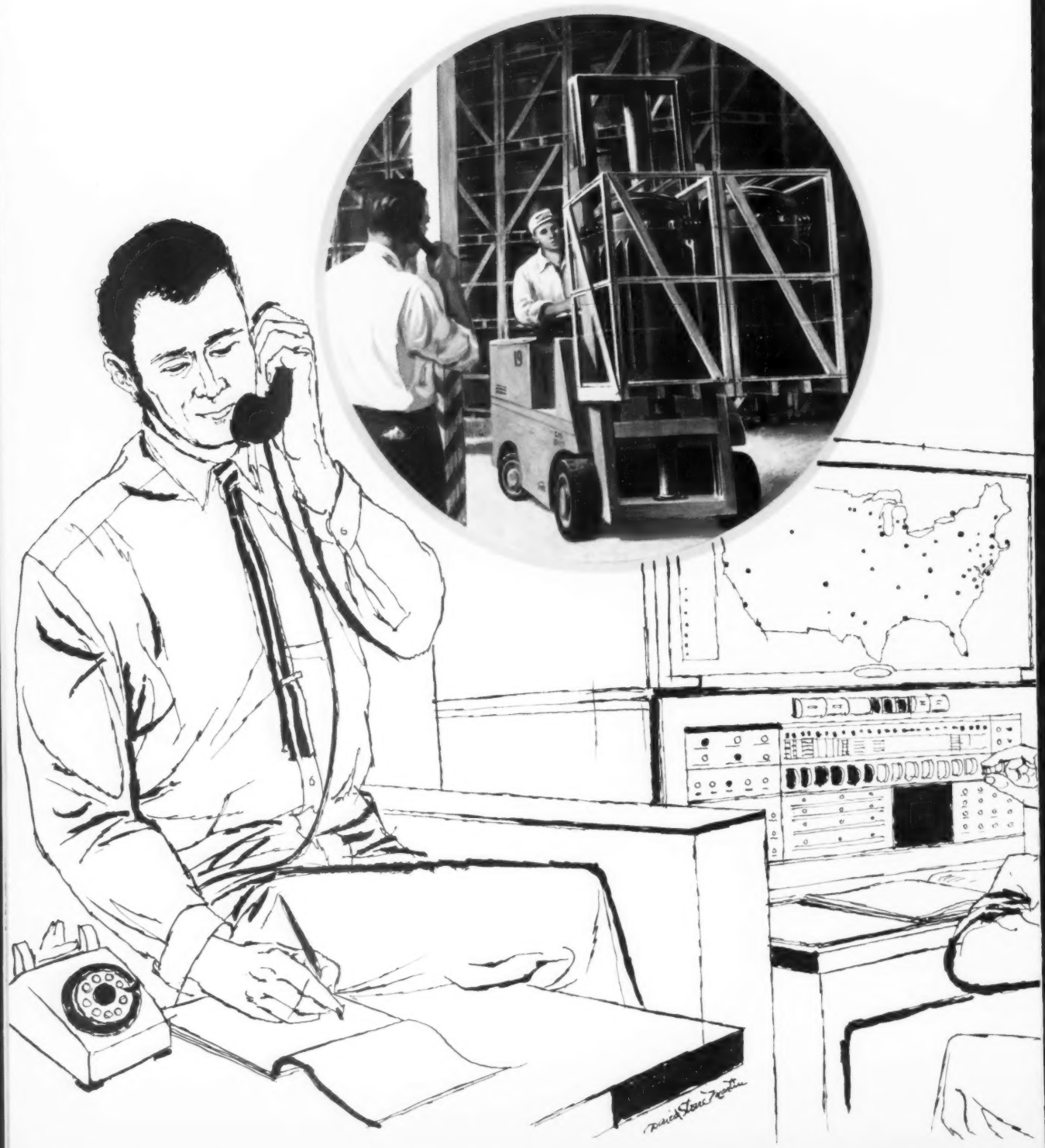
You, the subscriber, win when you buy business magazines that hold membership in the Audit Bureau of Circulations. The ABC symbol signifies that the publication to which you subscribe makes every effort to provide you with the type of informatin you need to do a better, more effective job. It also indicates that the publisher maintains the highest standards of business ethics.

McGRAW-HILL PUBLICATIONS

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42ND STREET, NEW YORK 36, N. Y.

Before you buy another



transformer... CHECK SERVICE

General Electric ships in 24 hours within the U.S.A. ...also rebuilds, repairs, and uprates

You cut distribution transformer inventories when you take advantage of G.E.'s fast delivery. No need to keep dollars on your shelves or to spend needlessly on warehouse handling and storage. General Electric has more than one hundred district warehouses, backs them up with extensive factory stocks, and offers you 24-hour shipment when needed.

Overnight shipment is only part of General Electric service. Service Shops—48 of them—put emergency repair service within convenient geographic range; these facilities prove their worth especially in times of flood, fire, and storm. Other service includes repair and uprating of your old transformers as well as technical advice on product or system problems.

Before you buy another distribution transformer, check service—give your transformer manufacturer credit for the extra values he gives you. General Electric Company, Schenectady 5, New York.

431-79

Progress Is Our Most Important Product

GENERAL ELECTRIC

GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU

		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

For multiple circuit street lighting...

THESE 9 ADVANTAGES MAKE KW ALUMINUM CABLE YOUR BEST BUY!

- Lighter weight than copper for equivalent current-carrying capacity
- Light weight simplifies installation handling
- Light weight reduces shipping, handling costs
- Easy to bend, form, train and cut
- Simple to splice, tap and terminate
- Lower overall cost per foot
- Excellent resistance to weathering
- Excellent flex characteristics
- Backed by 68 years of cable and insulation know-how

To offer utilities greater cable values than ever before, KW has brought its pioneering development in aluminum conductors together with the 68 years proved experience of "the masters of insulation" (formerly U. S. Rubber Wire and Cable division).

For multiple-circuit street lighting systems, KW recommends the constructions described at right. And for wire and cable to fill any utility requirement, call on KW specialists through your KW distributor or Kaiser Aluminum Sales Office.

Kaiser Aluminum & Chemical Sales, Inc., *Executive Office*, Kaiser Bldg., Oakland 12, Calif.; *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.

KAISER ALUMINUM

IF IT CARRIES CURRENT, KW *CARRIES IT!*

SEE "MAVERICK" • SUNDAY EVENINGS, ABC-TV NETWORK

Power Supply Cables—Aluminum Conductor

Single or multi-conductor cables, stranded aluminum, sizes 4 AWG and larger, up to 15 KV, shielded or non-shielded.

Specification No. 838-S
Hydrosec® insulation—Neoprene jacket.
For wet or dry locations up to 75° C. Type USE, Style RR, up to 600 volts.

Specification No. 831-S, up to 15 KV
Kalzone insulation—Neoprene jacket.
For wet or dry locations up to 90° C.

Pole and Bracket Cables—Aluminum Conductor

For use in circuits where voltage between conductor and ground does not exceed 600 volts. Sizes 8, 10 and 12 AWG, 7 strand aluminum.

Specification No. 819-S
Street lighting cable, Neoprene type,
Figure 8 Ziplite construction.

Specification No. 820-S
Performance insulation—weatherproof braid.

Specification No. 838-S
Hydrosec® insulation—Neoprene jacket. Type USE, Style RR.

Specification No. 202-S
Type UF Cable, PVC insulation—PVC jacket.

Specification No. 942-S
Laytex® insulation—Neoprene jacket,
Figure 8 Ziplite construction.

running at
MAXIMUM CAPACITY
for only ONE YEAR

THE SANGAMO J2 METER MAKES

23,343,648

FEWER REVOLUTIONS THAN ANY OTHER SINGLEPHASE METER!

The J2 Watthour Meter is the slow speed meter

Figure it out for yourself: If a class 100 meter carried a 100 amp. load day and night, it would measure 210,240 kilowatthours in one year's time. The Sangamo Class 100 J2 Meter, with its 6.0 constant, makes only 166⅔ revolutions to measure one kilowatthour. It would take 35,040,000 revolutions to measure 210,240 kwh. Meters with a 3.6 constant require 277.7 revolutions per kilowatthour and would have to make 58,383,648 revolutions to measure the same 210,240 kwh. That's a difference of 23,343,648 revolutions. Whether Class 100 or Class 200, Sangamo J Meters measure full capacity loads with 40% fewer revolutions.

Fewer revolutions mean less wear on all moving parts . . . and *less wear means longer service life.*

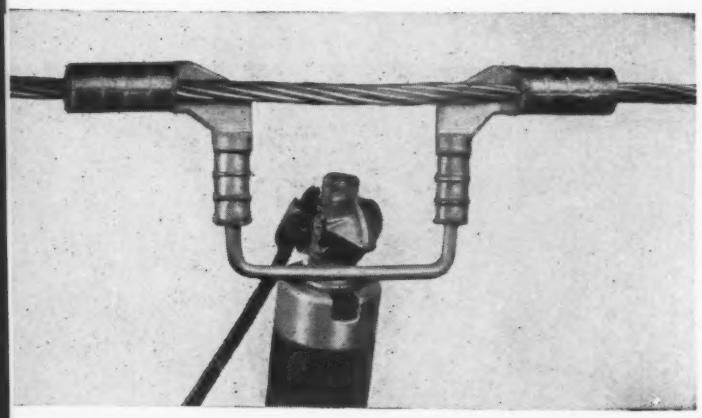
SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

JM58-6

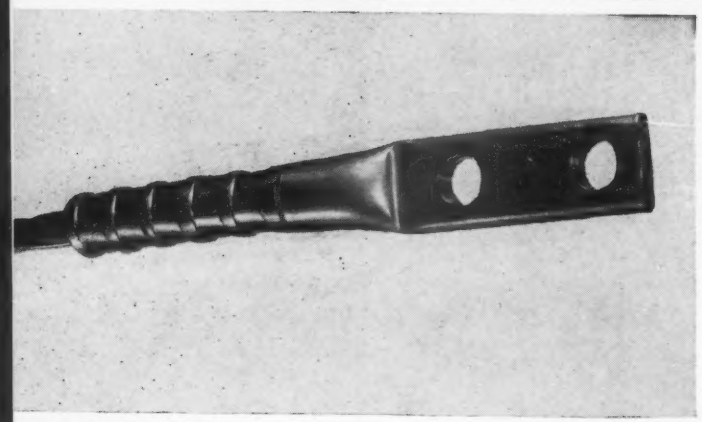
Kearney's compression program

Added versatility and increased application with existing tools—that's what an investment in Kearney Compression can mean for your system. Besides the basic connections—Squeezons, Serv-En Service Entrance Sleeves, Tension Sleeves and others—you receive the advantages of ever widening tool flexibility as Kearney Engineers continue to develop and introduce new Compression Fittings to the field.



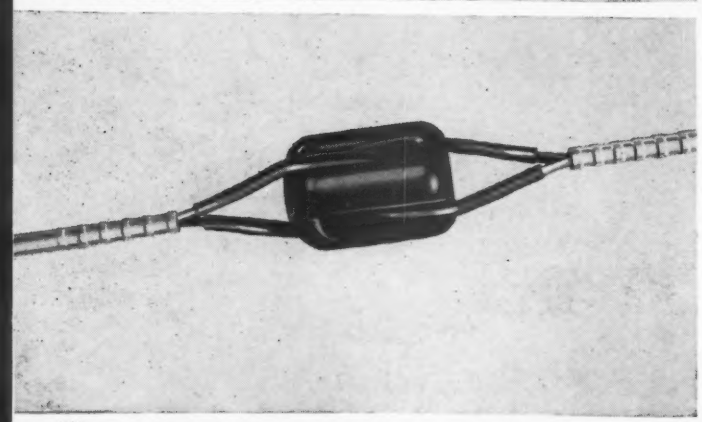
KEARNEY L Squeezon Stirrup

Line side connections are outside the basket—sufficient clearance for either the hydraulic or mechanical tool. The three inch dimension between the line and stirrup makes the unit neat and compact—hot line clamps are readily installed. Unit may be completely covered with line guards.



KEARNEY Compression Terminal

Kearney Compression Terminals provide an efficient method of connecting aluminum conductors to terminal pads. Flaring of strands possible with conventional terminal pads is eliminated. The strands are retained in an aluminum sleeve. Terminals have NEMA 1¾" bolt centers. May also be used as disconnectable jumpers around double dead-ends. The sleeves are filled with Kearnalex Contact Aid and capped and will take conductor sizes from 1/0 to 397.5 MCM 18/1 ACSR.



KEARNEY Insulated Splice

The Insulated Splice was designed primarily for splitting secondaries into shorter sections where additional transformers have been installed and for series street lighting applications. No changes in existing construction are required. Designed for copper, aluminum and ACSR connections, this splice features one piece construction, tension-type sleeves, insulated stainless steel bails and a high strength strain insulator. Splice can be installed with Kearney Hydraulic or Mechanical Tools. ACSR and aluminum sleeves are packed with Kearnalex Contact Aid and plastic capped.

JAMES R. KEARNEY CORPORATION • General Offices: 4224-42 Clayton Ave., St. Louis 10, Mo.

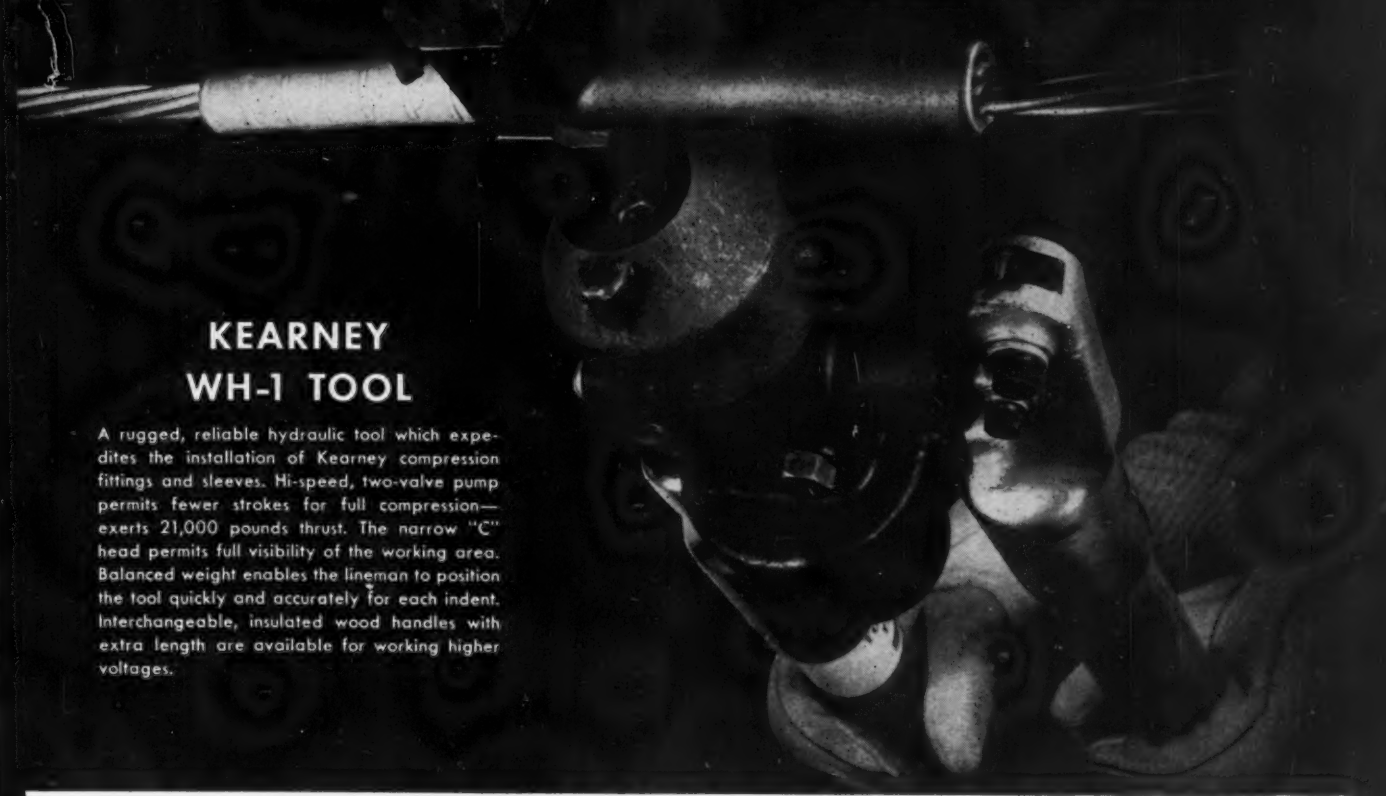
pays extra dividends

KEARNEY INSIDE TAPERED COPPER SLEEVE

A completely new, cost-cutting design—another Kearney "dividend"—permanent, positive, full tension splicing of energized conductors with standard Kearney tools and dies.

ADVANTAGES—

1. **Metallizing process**—copper sleeve is sprayed internally with conductive metal to assure maximum holding power and high conductivity.
2. **Full Inside Taper**—design assures ease of insertion of hot conductors—also relieves stress, due to vibration, at the extremities of the sleeve.
3. **Shorter Length** means less installation time, fewer crimps and no sacrifice of holding power—sleeve is more easily stored.
4. **Clearly marked** with conductor and die sizes.



KEARNEY WH-1 TOOL

A rugged, reliable hydraulic tool which expedites the installation of Kearney compression fittings and sleeves. Hi-speed, two-valve pump permits fewer strokes for full compression—exerts 21,000 pounds thrust. The narrow "C" head permits full visibility of the working area. Balanced weight enables the lineman to position the tool quickly and accurately for each indent. Interchangeable, insulated wood handles with extra length are available for working higher voltages.

FOR BETTER CONSTRUCTION—SAFER MAINTENANCE

Specify Kearney Products

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,**
Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix.

PLANTS AT: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

Control Cable Savings Begin with Small Diameters

For New Work or Rewiring...

SPECIFY & BUY
ROCKBESTOS
PNR
600 VOLT CONTROL CABLE

PNR — Polyethylene • Nylon • Rockhide (PVC)

HERE'S THE PROOF WHEN IT COMES TO CONDUIT FILL

No. 12 A.W.G. (19/25)		1 CABLE PER CONDUIT				2 CABLES PER CONDUIT				3 CABLES PER CONDUIT				4 CABLES PER CONDUIT			
		Max. Cable Dia."	Number of Conductors in one Cable			Max. Cable Dia."	Number of Conductors in one Cable			Max. Cable Dia."	Number of Conductors in one Cable			Max. Cable Dia."	Number of Conductors in one Cable		
COND. SIZE.		Table 11 N.E.C.	ROCK PNR	3/64"	4/64"	Table 11 N.E.C.	ROCK PNR	3/64"	4/64"	Table 11 N.E.C.	ROCK PNR	3/64"	4/64"	Table 11 N.E.C.	ROCK PNR	3/64"	4/64"
½"	New Work	.450	2-4			.243				.234				.195			
	Rewiring	.479	2-4			.276				.252				.218			
¾"	New Work	.598	5-7	2-3		.323				.311				.260			
	Rewiring	.636	5-8	2-4	2	.367				.335				.280			
1"	New Work	.762	8-14	4-7	2-4	.412	2-3			.396	2						
	Rewiring	.811	8-16	5-8	3-5	.468	2-4			.427	2-3						
1¼"	New Work	1.000	15-19	8-12	5-8	.543	4-5	2-3		.523	3-5	2-3					
	Rewiring	1.070	17-19	9-16	6-9	.618	5-8	2-4		.564	4-5	2-3					
1½"	New Work	1.170		13-19	9-12	.634	6-8	4	2	.610	6-7	4					
	Rewiring	1.248			10-14	.721	9-11	5-7	2-4	.658	6-8	4-5	2				

This is an excerpt from the Rockbestos Control Cable Conduit Fill Chart covering sizes A. W. G. 9, 12, 14. Write today for your free copy. Ask for PNR 1-58.

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS • ATLANTA • DALLAS
SEATTLE • LOS ANGELES • BURLINGAME, CALIFORNIA

ROCKBESTOS

PNR
Small Diameter Control Cable

MORE THAN 16,000,000 FEET IN SERVICE

THROUGH PLOWBACK OF EARNINGS
THESE MILESTONES IN ENGINEERING ACHIEVEMENT
ARE SOLVING YOUR FUTURE POWER PROBLEMS

Westinghouse builds world's ten largest tandem-compound turbine-generator units

The challenge to America's electric utilities has grown through the years to the point where the builders of power generation equipment must find the answers not only to today's load growth problems, but to those of the years ahead as well.

As the capacities of turbine-generator units have had to increase, so has the complexity of the machines. Building larger, more economical equipment has become the index of a manufacturer's research and engineering ability.

In answer to this challenge, Westinghouse is again proving its leadership in the field by designing and building the most powerful tandem-compound turbine-generators the world has ever known—units capable of producing as much as 325mw! Two of these 3600-rpm tandem-compound units are now in service, each with a capacity of 250mw. Eight more are shipped or on order, with ratings of 250, 275, and 325mw.

YOU CAN BE SURE...IF IT'S **Westinghouse**

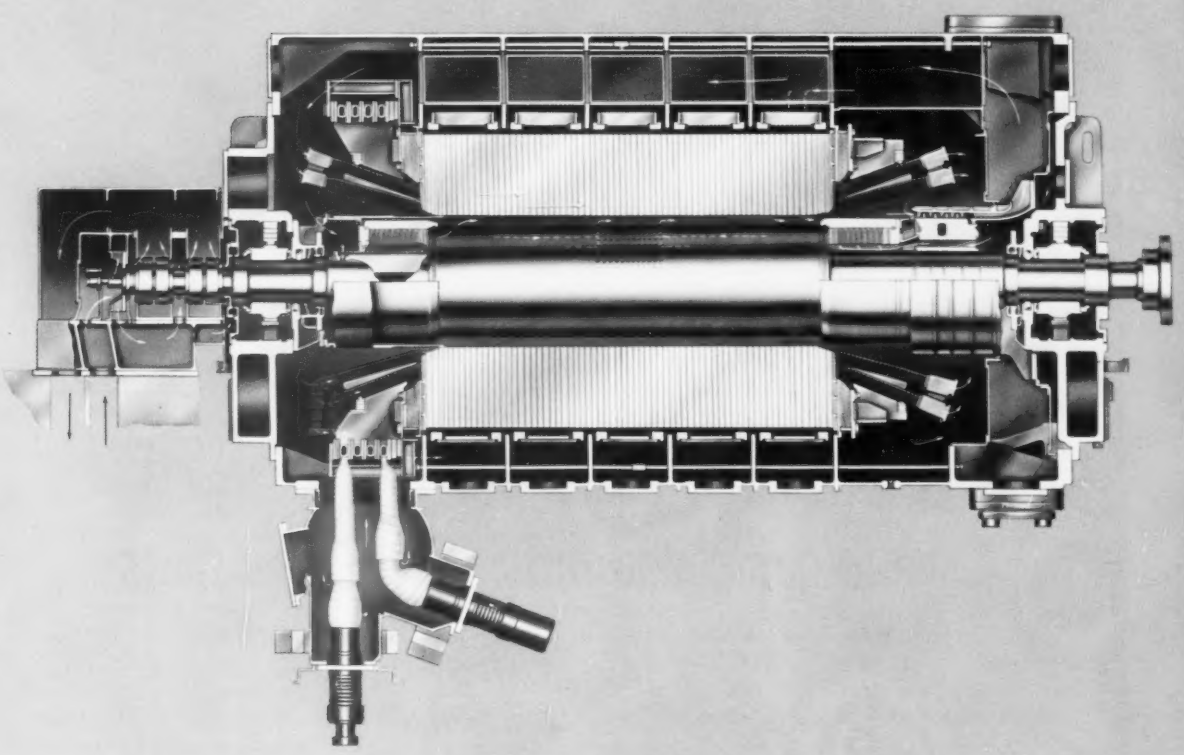
WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

HELPING YOU TO MEET TOMORROW'S LOAD GROWTH NEEDS . . .

Westinghouse engineering and research have made these tremendous capacities practical, efficient

In 1934, when Westinghouse built the first large 3600-rpm single-shaft turbine, there began a revolution in turbine and generator design which today permits the building of gas-cooled generators in ratings of over a half million kva in a single 3600-rpm unit.

Two advances were responsible for such high-capacity generating equipment—Inner-Cooling and Thermalastic insulation.



YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

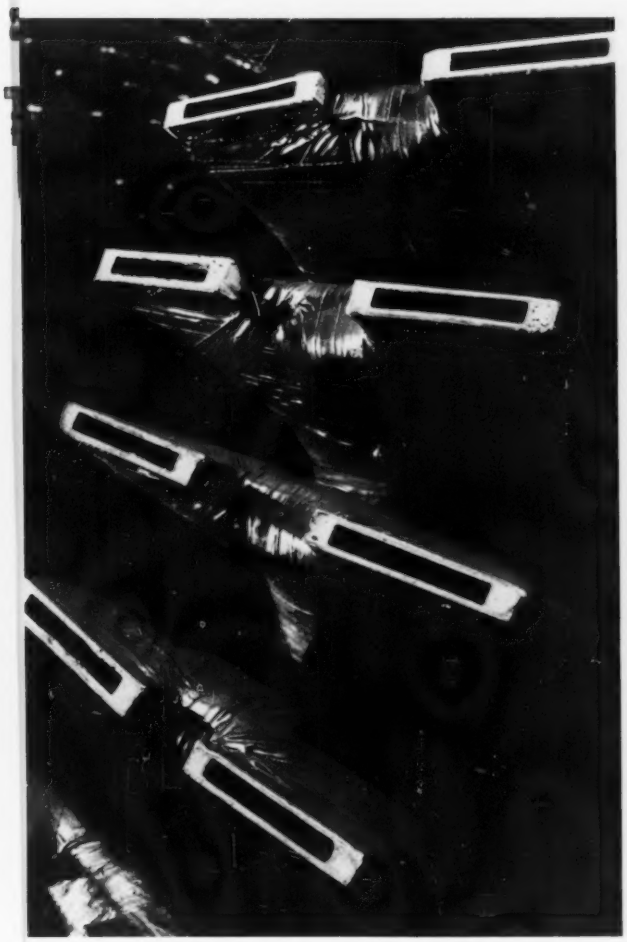
FOLD OUT

INNER-COOLING

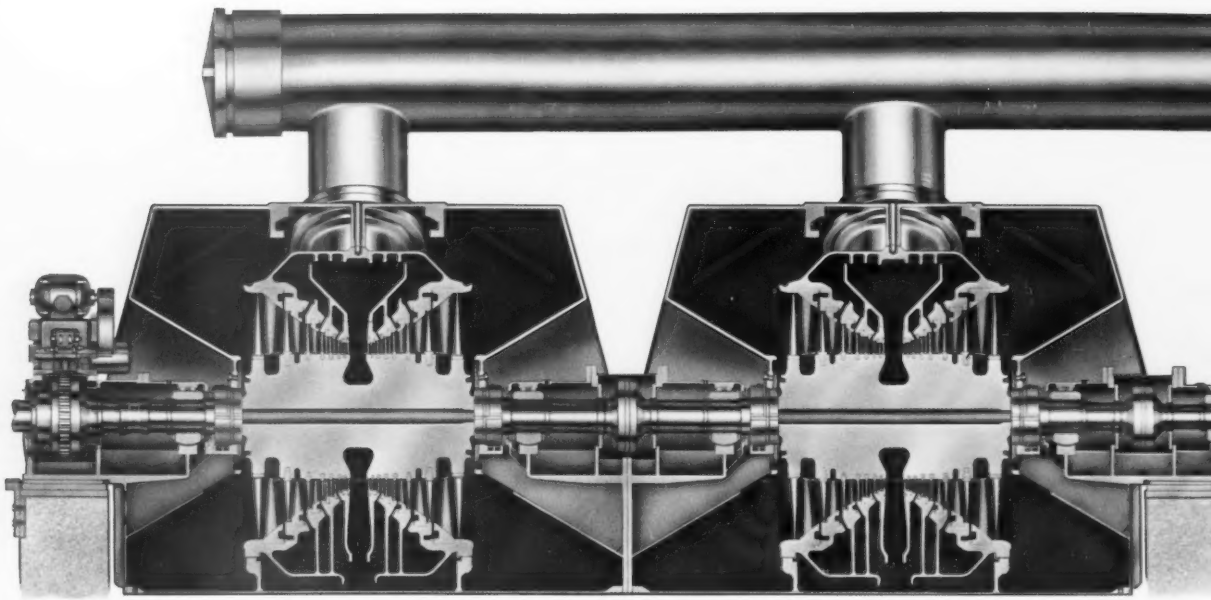
The Westinghouse-pioneered Inner-Cooling system has made it possible to circulate hydrogen through the inside of the rotor and stator windings, providing intimate contact with the conductors where the heat originates. It is by far the simplest and most effective method of cooling ever devised. Already proved in extensive service, Inner-Cooling has doubled single-shaft ratings over conventionally cooled units, and it has greatly reduced the size and weight of equipment.

THERMALASTIC® INSULATION

Thermalastic insulation, known as the "insulation with a memory," has a unique molecular structure which permits expansion and contraction of the windings without injurious deformation throughout the life of the machine. Voltage endurance tests prove that Thermalastic insulation has a one thousand-to-one advantage. Operating voltages cannot get through the fish-scale barrier of large mica splittings, which are locked in a memory-type elastic bond.



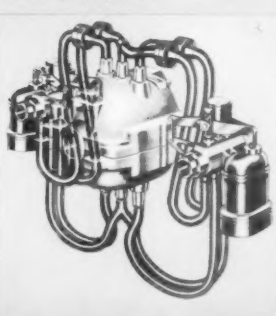
These important steps to greater generating capacity are paving the way to the ratings needed to meet future load growth with the greatest possible efficiency and economy



FROM RESEARCH LABORATORY TO POWER STATION . . .

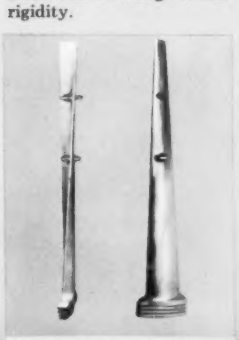
These exclusive Westinghouse "firsts" are now standard features of the world's largest tandem-compound turbine-generators

Two Separate Steam Chests: Simplifies turbine casing and steam chest construction, minimizes thermal stresses and permits inherently stronger pressure containers. The two chests, located at the sides of the casing, are connected to the casing only by flexible pipes and permit complete functional testing without excessive load reduction.

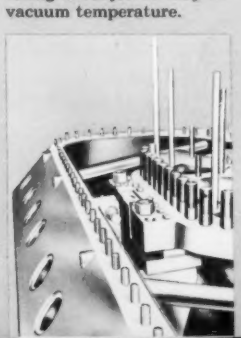


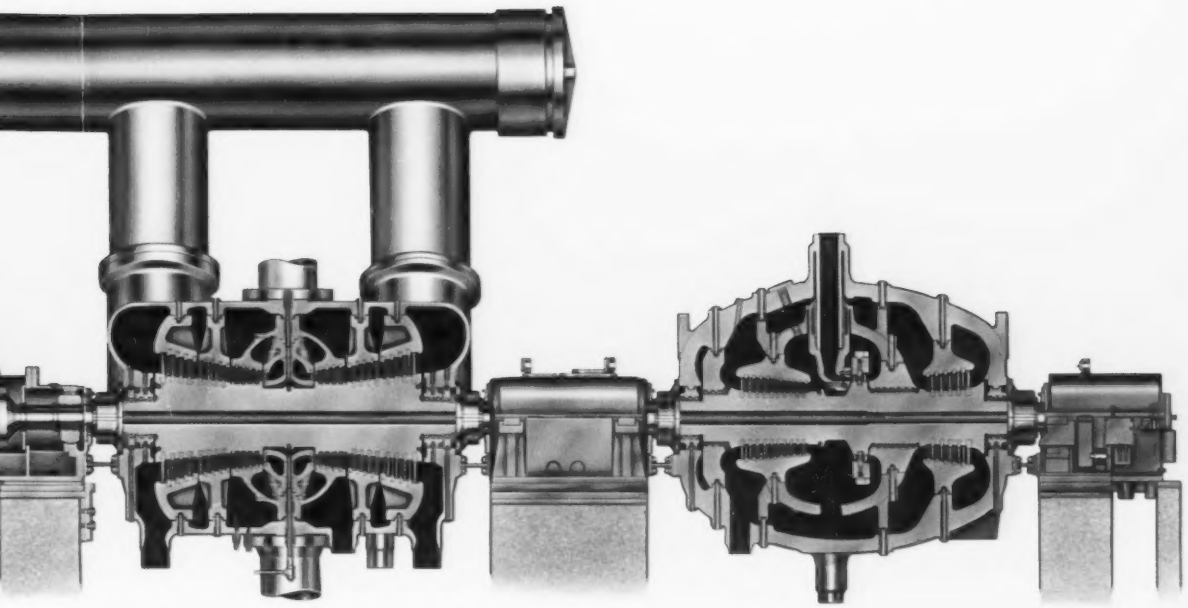
Side Entry Roots in High-Pressure Element: This is the highest strength fastening yet developed.

Side Entry Roots in Low-Pressure Element: The curved side entry fastening provides great strength and transverse and longitudinal rigidity.



Stationary Blade Ring Supports in Low-Pressure Element: Designed to expand concentrically with the rotor without imposing stress on the casing. The outer casing is subjected only to vacuum temperature.





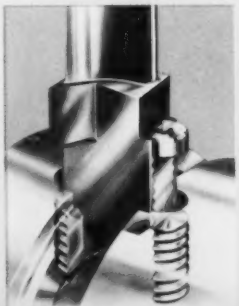
The results of Westinghouse research and engineering are embodied in the above 325-mw, 3600-rpm reheat turbine.

Below are outlined but a few of the typical features of the industry's most advanced turbine-generators—features which put them years ahead in ability to meet demand with maximum economy and efficiency.

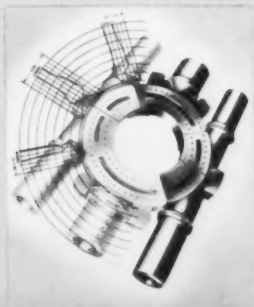
Sup-
Ele-
pand
e ro-
tress
outer
ly to

New Type of Blade Root in Intermediate Pressure Element: Side entry fastenings similar to those in the high- and low-pressure elements are used effectively in highly stressed areas.

New Blade Locking Device in Intermediate Pressure Element: For single and double tee root blades, a new last blade locking device greatly reduces rotor stress.



Separate Nozzle Chamber Construction: This design advance minimizes thermal stresses. The chambers are welded to the inner casing by flexible sleeves, allowing them to expand and contract independently of both the casing and of each other.



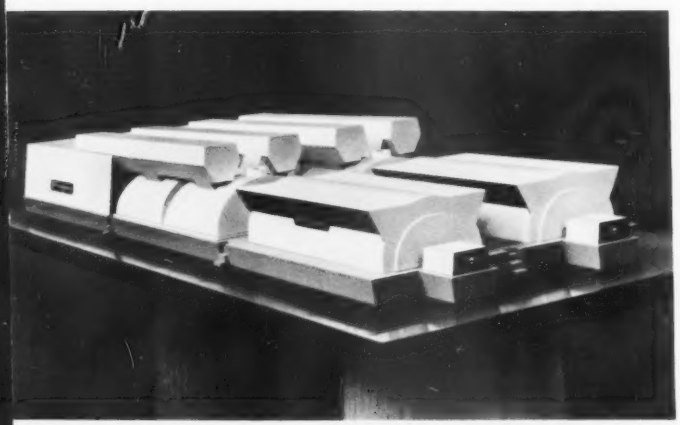
Mass Flow Cooling: Permits the insulating and cooling effect of steam to limit temperature gradients and to control the temperature at which various parts of the turbine operate. Minimum wall thicknesses and bolt sizes provide maximum reliability and minimum maintenance.

Acceleration-Responsive Governor — the Accelerometer: An auxiliary governor which gives instant response independently of rotor speed. This response is based on acceleration, replacing the older speed-responsive governor. With the large capability-inertia ratio of 3600-rpm tubine-generator units, the use of such a highly sensitive governor protects the unit from dangerous overspeed should the electrical load be lost.

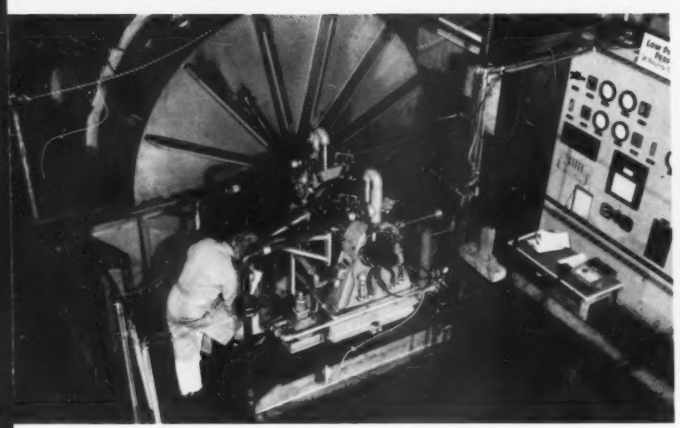
THROUGH PLOWBACK OF EARNINGS . . .

research in action . . .
the turbine of 1970 is a laboratory reality!

In the Steam Division's Development Laboratory, Westinghouse is uncovering the answers to questions of the future before a need becomes an emergency! A new peak of efficiency for the 1970 turbine, model shown below, will be assured by steps being taken now, and over the next 12 years.



Development engineers are now evaluating a new Westinghouse alloy that may be the metal of the future. For example, at 1200°F, the tensile strength is a phenomenal 100,000 psi. Damping characteristics are also excellent. After exhaustive tests, Nivco alloy will become another Westinghouse "first."



Another major development project revolves around a unique L-P turbine test facility. Westinghouse engineers are using this $1,000,000 test tool on numerous combinations of new designs, recording the performance of low-pressure components under varying conditions.

One giant stride is being accomplished in the 325-mw supercritical turbine now being built. This unit will be the world's most efficient turbine and will use the highest temperature and pressure steam in history—5000 psi at 1200°F.

These and many more Westinghouse developments —some already accomplished and more yet to come—are your assurance of the best in research and engineering quality. They are your assurance of a better electrical future. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

JI-50606

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Ask your Westinghouse representative about the new turbine-generator film, "What It Takes."

Problems of Management—XII

Creativity—Today's Problems vs Tomorrow's Dreams

Today's most efficient producer can control today's market. But tomorrow's market will be controlled by today's ability to adapt, to innovate, to invent—by creativity.

Automatic machinery is revolutionizing accounting. TV changes advertising practices. Technological advances change every production line. The small foreign car rocks the automobile industry.

Management is being forced to adapt quickly to new conditions. Recognizing the need for new thinking, the alert company must move to build up its creative potential.

The creative man tends to be constantly on a search for new and better ways to do things. He becomes a challenger. People who challenge the established order of things tend to be regarded as troublemakers. Often they stick their necks out and sometimes they need protection. Billy Mitchell in the early '20s was a creative and disturbing nuisance when he tried to picture the role of aircraft in future wars. Years later they admitted he was right, although ahead of his time.

Many organizations have paid a high price for stifling or ignoring the creative mind.

In some organizations there is much effort expended to find a creative genius for the research department. At the same time, new ideas would not be tolerated in engineering or accounting.

How Organization Stifles Creativity

The watch words of organiza ion are planning and control. They make for efficiency. Systematization and specialization restrict the areas of knowledge and interest of the individual. Confining his activities to a narrow area might make him efficient but it leaves out the broad understanding and association of ideas that are the breeding ground for creativeness. Time and energy are not available for pursuing creative thinking or any activity not in the schedule.

In contrast to this orderliness is the unpredictable and erratic process of invention. The apple that jarred Newton to explore the laws of gravity is an example. Sitting under apple trees is inefficient! Or is it?

Long periods of overorganized work cause what is known as "conditioned thinking." Concisely stated, it is the notion that "what was good enough for father is good enough for me." The combination of personal biases and company policy or standard practices leads to a blind traditionalism that is the absence of any creative thought. To combat this, some companies conscientiously try to rotate work assignments. Good business?

While there has been some promising work done in an effort to teach creative thinking—much like chemistry or algebra—it is much more important to encourage and use the creative abilities already present. The care and feeding of the creative mind is a *key management responsibility*.

In order to stimulate the idea man, he must be understood. The creative man has a long nose and keen eyes. He can see or smell a problem or a solution before nose-to-the-grindstone folks suspect its existence. This fact points up the need for easy-going communications —lest the idea die aborning or never come to light.

This points up another earmark of the creative man. Every idea isn't great. Of all the patents in Edison's name, only a few went into mass production. All were products of the same mind but the *need* for the ideas varied.

Creative thinking gets discouraged in many companies where too much emphasis is placed on being right. Middle management gets supercautious and avoids pushing ideas when it knows from experience that a mistake may be fatal.

The creative man could come up with an idea that might work—and then again it might not. Does our company judge a newly proposed idea by the same standards as one which is, in essence, a completely safe repetition of an old practice? Are we prepared to recognize the element of risk in adopting a new process? Have we trained our managers to search out the best possible solution to problems or do they look for a completely safe solution?

One means of improving the idea batting average is to keep people broadly informed on the relationship of their work to the whole, as well as the problems and objectives of the company and department. One progressive company encourages people to spend time in other departments and rebukes any manager who resents visitors (snoopers) in his department. Efforts such as this serve to stimulate new ideas and to direct thinking toward the big picture—not the narrow thinking that may be fine for one department but detrimental to the company.

Creative ideas come most often to men who have a wide range of information all tucked away in their minds and cross-referenced. The creative man works for a company in which he feels free to go and get information from a lot of other people.

Creativity demands some freedom from the pressure of work. Managers must somehow develop a balance between work and a little relief from work—time off for contemplation of the larger and vaguer issues that may have a more direct bearing than seems apparent. Conventions, conferences, special projects and trips as company representatives consume both time and money, but may prove to be valuable investments.

Profits result from increased efficiency; they also result from creativity. The means by which the two end products are achieved are sometimes not compatible. Management must set up a balance. This is a key management problem.

Check Your Score On Test, Page 19

1. False	6. False
2. True	7. False
3. False	8. True
4. True	9. False
5. False	10. False

A 15-kv 400-amp station-type disconnect at a distribution disconnect price

No Sticking!...No Burning! No Pitting!...No Welding Shut!

Silver-weld contacts, a unique new development, provide 20,000 ampere momentary rating for this distribution disconnect

How is it possible to get this performance?

The answer lies in the methods of applying silver to the contact surfaces.

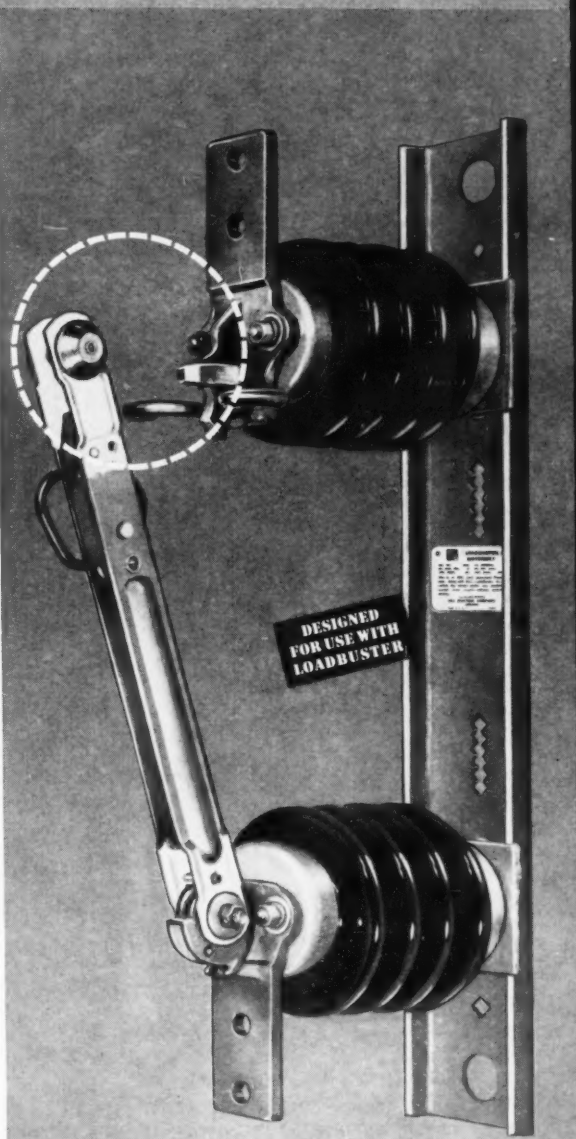
To apply silver to the contact castings, a new, patented process is used which includes special preparation of the contact surfaces, preheating them in a neutral atmosphere, fusing onto them molten particles of silver alloy, and then coining for hardness control, contour, and low porosity.

To apply silver to the blade, another method is used. The blade is silver-clad with extra-thick, high-density, low-porosity silver.

The result is a silver-to-silver contact which does not seize or gall and which makes possible the high current ratings.

But performance of a new disconnect is one matter, and performance after normal usage and exposure to atmospheric contamination is another. In practice, a distribution disconnect may be left in the open or in the closed positions for very long periods, with contacts exposed to corrosive atmospheres, typically without maintenance. Recognizing this fact, S&C has designed a disconnect that will carry its rated load, even after hanging open for long periods. On the other hand, this new S&C disconnect will open without difficulty, even after long exposure in the closed position.

And without extra cost, you get full load switching with LOADBUSTER® when you fit your distribution system with S&C LOADBUSTER Disconnects. Write today for Descriptive Bulletin 721, to S&C Electric Company, 4425 Ravenswood Avenue, Chicago 40, Illinois. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.



LOADBUSTER® DISCONNECTS

Disconnects • Cutouts • LOADBUSTER® • Load Interrupters • Metalclad Switchgear • Fuse Links • Power Fuses

Specialists in High-Voltage Circuit Interruption Since 1910

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SPECIAL SERIES

In financial aid to education . . .

What Should Business Do Now?

Now that the federal government is entering the field, should business firms stop giving financial aid to our colleges and universities?

This question is now being discussed by business directors throughout the country. The discussion is prompted by the near-billion-dollar program of federal aid to education passed by Congress a few months ago. For if the federal government, with its access to billions in taxes, is assuming responsibility for the financial welfare of education, should not business get out of the way and let the government take over? This is the general way the question is being asked.

The answer is a resounding NO.

What The Federal Program Does

The new federal program makes it possible for the government to spend the imposing total of $900 million for aid to education over the next four years. There are still many loose ends in the program. But already it's quite clear what such funds will — and will not — do to help relieve the financial plight of our colleges and universities.

First of all, the program is not going to solve any financial problems in education overnight. The program is just barely underway. So far no money has actually been allocated, and Congress has appropriated only $40 million — less than 5% of the total.

More important, there is very little in the total program which will result in direct aid to colleges and universities. The program does set up fellowships to train college teachers. But most of the aid will eventually be channeled through the states to primary and secondary schools. The main focus of the program is education for national defense — strengthening science, mathematics and foreign languages in elementary and secondary schools, together with grants for counseling, testing and research.

The one big item for higher education is a $295 million student loan program, which will help needy students pay tuition and other fees. But tuition rarely covers the full cost to the college of educating a student. So the net result could well be an additional financial strain on our institutions of higher learning.

For the three most pressing financial needs — faculty salaries, scholarship grants and new plant and equipment—colleges and universities must still rely heavily on help from the business community. And it would indeed be a major

misfortune if the recent actions of the government put a blight on this growing and substantial support to higher education.

In the last ten years, business has expanded its financial aid to education by more than four fold. In 1948, contributions were only $24 million. In 1957, such aid reached an estimated $125 million. Moreover, corporations have been putting a larger proportion of their total charitable gifts into education. In 1950, the percentage was only 17%. By pre-Sputnik 1956, the share had already increased to 34%, according to figures recently released by the Council for Financial Aid to Education.

Why Business Must Help

The most compelling reason for increasing business aid to higher education — at an even faster rate—is that our colleges and universities desperately need financial help. It is that simple. Private contributions to higher education must average at least $400 million over the next ten years if our colleges are to meet rising operating costs and raise faculty salaries to decent levels. Despite the growth in business contributions, we are still well below that goal.

If our colleges cannot solve their mounting financial difficulties through voluntary help from business firms, alumni and communities — then it is to be expected that federal aid ultimately will be mobilized in a big way. In principle, if not in dollars, the 85th Congress has paved the way. Indeed, a large federal scholarship program was squeezed out of this year's legislation only in the course of last-minute compromises. And Arthur S. Flemming, Secretary of Health, Education and Welfare, has urged that the next session of Congress restore the scholarship program.

About any federal rescue operation for higher education, two things are quite clear:

(1) **Such aid will come too late to prevent irreparable harm resulting from the current shortage of funds.** The need for help is urgent and immediate.

(2) **With federal taxes taking over half of all corporate income, any federal program in the end will be financed in large part by the business community.**

An Opportunity

So, viewed narrowly, it is in the selfish interest of business firms to aid our colleges and universities now, rather than wait and be forced to pay later on. By doing so, they ensure that business will have a continuing supply of well-trained graduates. They take advantage of the tax laws for charitable contributions which mean the government in effect assumes more than half the cost of business aid to education. And they win gratitude for a voluntary and generous act.

Viewed in the broad public interest, the business community has an opportunity to perform a financial rescue mission in education which could well be the key to successful survival, not only of our present system of higher education, but also of the nation itself.

As previous editorials in this series have pointed out, a very small share of the net income of business firms — about 1% — would do the job. Certainly business must not be distracted from this opportunity by the new venture of the federal government in financial aid to education.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

RT&E grows to better serve the growing west

NOW IN OPERATION!

a New RT&E Manufacturing Plant in Portland Oregon

RT&E Corporation proudly announces completion of its new western manufacturing plant in Portland. Operations started on May 1. This fully integrated facility, with 23,000 square feet of office and manufacturing space, will provide faster service for transformer users in the eight western states. In addition to manufacturing, it will add another outlet to R T & E's nation-wide branch distributing warehouses to serve this growing area.

In its rapid but steady growth over the past eleven years, R T & E has continuously relied on three basic ingredients to achieve success——— people, product, and facilities.

1 PEOPLE... skilled people to manage, engineer, build, and sell

2 PRODUCT... a superior product, creatively designed and carefully made.

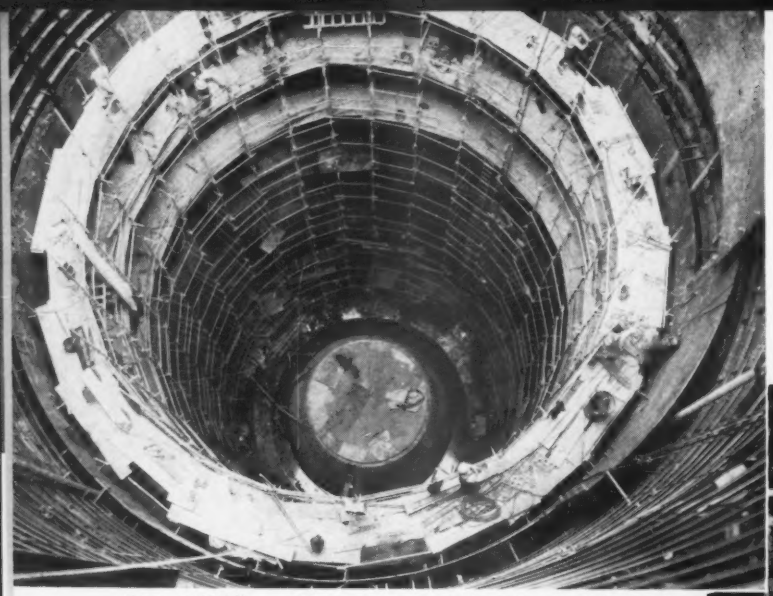
3 FACILITIES... modern machinery, distribution, and plant facilities.

ENGINEERING TALENT CONCENTRATED ON ONE IDEA — A BETTER TRANSFORMER

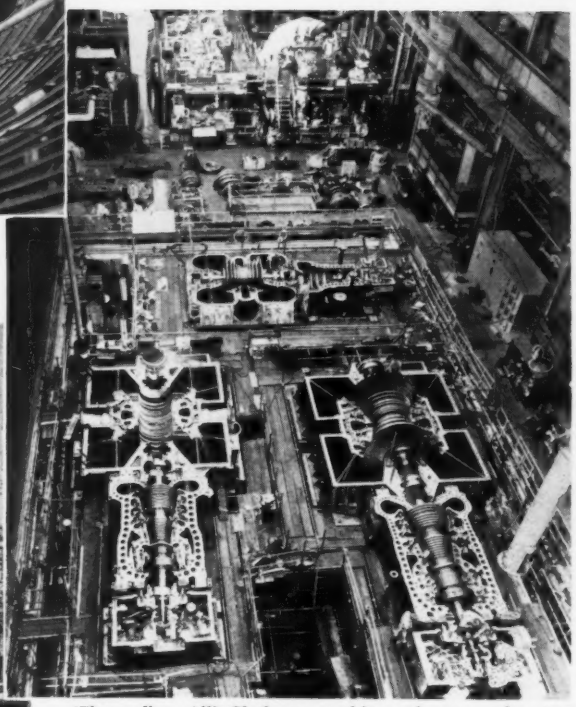
RT&E CORPORATION

WAUKESHA, WISCONSIN — PORTLAND, OREGON

news

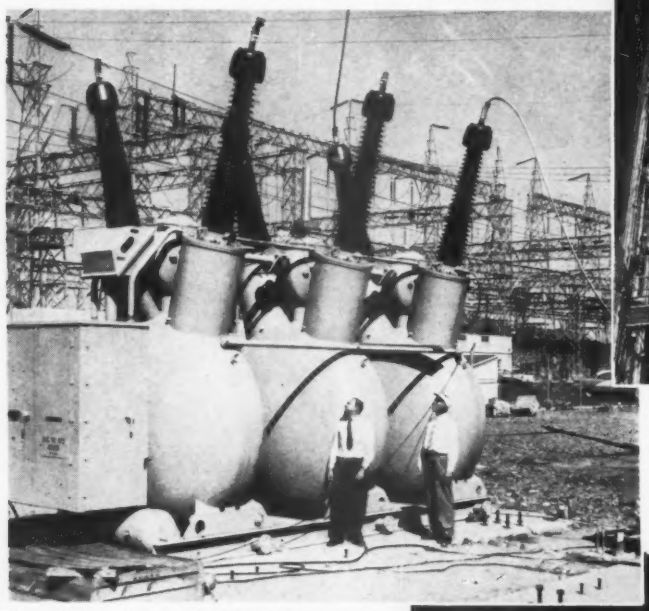


Iron scaffolding and concentric steel rings form an interesting pattern as the surge chamber of Pacific Power & Light's Swift project takes shape. The chamber is 180 ft deep and 55 ft in diameter. As you read this the reservoir will be near operating level

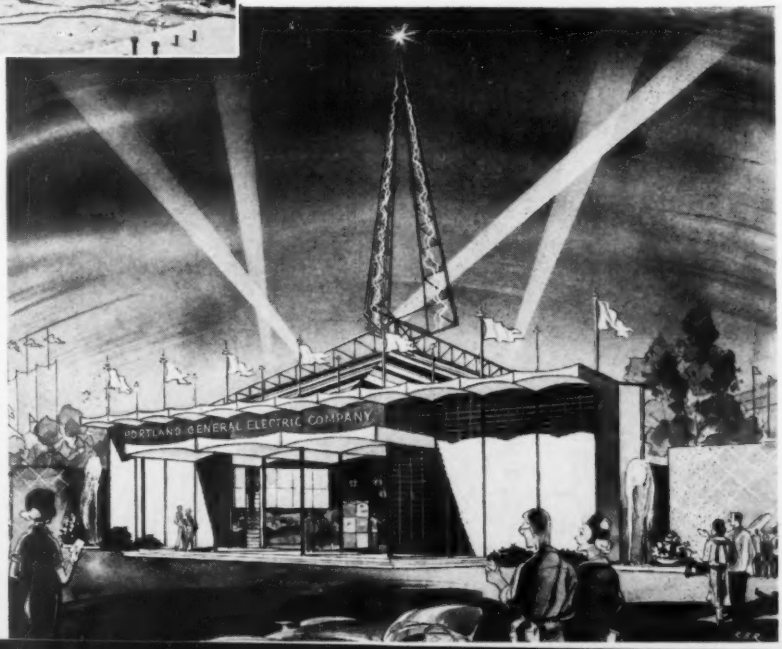


These five Allis-Chalmers turbines shown under test represent 400,000 kw of the 2,000,000 kw of generating capacity A-C will have supplied the electrical industry by the end of this year. Two are coming West

Portland General Electric has planned an exhibit for the 1959 Oregon Centennial (See Market Development)



This 230-kw General Electric circuit breaker recently interrupted a 15,000,000-kva short circuit at Grand Coulee. USBR and Bonneville Power conducted the test



Robert de Luccia, vice-president and chief engineer of Pacific Power & Light Co., answers questions of touring engineers at PP&L's Swift Dam. It will operate soon

Management

Horton

New Prexy for SoCalEd

Changes in the top management of the Southern California Edison Co. will bring J. K. Horton to the presidency of the company. He succeeds Harold Quinton who has been elected chairman of the board and has been the chief executive officer since 1954. W. C. Mullendore retires as board chairman as of Feb. 1, 1959.

"Jack" Horton has been a vice-president of the Pacific Gas and Electric Co. and more recently president of the Alberta & Southern Gas Co. Ltd., a Canadian company which is seeking to export gas from Alberta to northern California. He is a graduate of Stanford with a B.A. degree in economics and holds a law degree from Oakland College of Law. Subsequently he was a legal specialist in oil and gas leases for the Standard Oil Co. of California and was elected president of the five-member Pacific Public Service holding company at the age of 35. That group included the Coast Counties Gas & Electric Co., which merged with PG and E in 1954. At his present age of 42 years, he will be one of the youngest utility presidents in the country.

Mr. Mullendore retires after 33 years of continuous service with the Edison company, the last 30 of which have been as a general officer. He was president from 1945 to 1954, chairman of the board since that date and he will continue as a member of the board of directors.

BPA Red Ink

For the first time in its history, the Bonneville Power Administration operated at a net deficit, $2,949,501 for the fiscal year of 1958 despite a new record of $66,729,110 in revenue. This situation was brought about, according to Administrator William A. Pearl, by the increased cost of operation without substantial increases in revenue. The recession and the mild winter are major factors in contributing to the decreased revenues.

Bonneville's base rate for firm power of $17.50 per kilowatt-year has been unchanged since 1938. In the intervening time BPA has been able to get more than $76,000,000 ahead on the repayment schedule on the federal investment in the Columbia River system.

New Mexico Utility Seeks 115-Kv Line

The Public Service Co. of New Mexico has asked the Public Service Commision of that state for the authority to purchase a 70-mile, 115-kv line extending from the west edge of Albuquerque to the uranium-rich Ambrosia Lake area near Grants, N. M. The line presently is owned by Kermac Nuclear Fuels Corp. and the Phillips Petroleum Co. The latter company is now taking power from the line to operate its $9.5 million uranium mill in the Ambrosia Lake area and Kermac expects to begin mill operations early next year.

The line is energized from the West Mesa substation of the utility. One reason for the acquisition, costing an estimated $1.5 million, is that the power company could maintain the line more readily than the two mining concerns. While the line impinges on the territory now served by Rural Electrification Administration cooperatives, the Public Service Co. of New Mexico already has a franchise in Valencia County which is the area covered by its Belen division.

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Huge B. C. Project Moves Ahead

Plans for the $500 million 3,000,000-kw hydroelectric development on the Peace River were further firmed up by the announcement that the British Columbia Electric Co. and three other companies have joined interests with Swedish financier Axel Wenner-Gren to form the Peace River Power Development Co. One of the participating companies is the Associated Electrical Industries of Britain.

Studies by the Swedish firm indicate that the development is feasible economically and the project is expected to move in to a new stage of preparatory operations early in 1959.

New Projects for Southwest Washington

The Klickitat County and Skamania County PUDs in southwestern Washington are planning projects that will eventually produce more than 200,000 kw. The Klickitat project plans developments on the White Salmon River totaling 177,000 kw and the Skamania group seeks development of 30,000 kw from the waters of the Little White Salmon and Rock Creek.

To finance preliminary planning, the U.S. Housing & Home Finance Agency has approved loans of $325,000 to the two PUDs.

► Two new nuclear power plants, basically to supply military installations in Alaska, are in the making. Nuclear economics are different in the 12th Western state where fuel oil to power diesel generators at Alaska bases has to be flown in at a cost of about 30¢ a gal.

Big Financial Deal

Commissioners of the Grant County Public Utility District, Ephrata, Wash., have made arrangements with the First Boston Corp. and affiliates to handle the multimillion dollar financing of the Wanapum Dam, upstream 18 miles from the Priest Rapids Dam now under construction. The dam will have a capacity of 620,000 kw.

Cost of the dam is estimated at $200 million, with the bond issue financing to run 50 years. A PUD representative said it is hoped to issue a call for the Wanapum bond issue next spring, with actual construction to start in May or June 1959.

► The Los Angeles Department of Water & Power has contracted with a New York firm for a survey to determine its office space requirements. As of now 2,800 department employees are located in eight office buildings in central Los Angeles. The utility owns a building site in the new civic center on Bunker Hill in Los Angeles and the survey will aid plans for a new water and power headquarters building.

► REA Administrator David A. Hamil proposed a one-half of 1% increase in the interest rate on Rural Electrification Administration loans granted by the federal government. Hamil cited the fact that the government was loaning money to cooperatives at rates less than it could obtain in loans for itself. REA loans are now paid off at a 2% interest rate over a 35-year period; the 2½% interest rate would enable the agency to carry its own weight financially.

► The Wyoming Public Service Commission has authorized the Big Horn Rural Electrification Assn. to obtain $413,000 as a REA loan to build a new substation near Deaver, Wyo., and 62 miles of distribution line to serve 176 additional customers.

► Ceremonies observing the start of construction on John Day Dam on the Columbia River near Maryhill in Klickitat County were held last month. This latest Columbia River dam will be built under the supervision of the U.S. Corps of Engineers.

► Ralph J. Cordiner, chairman of the board of the General Electric Co., received the James H. McGraw Award, Electrical Manufacturers Medal and Purse, at the annual meeting of the National Electrical Manufacturers Assn. at Atlantic City last month. He was cited for his outstanding personal leadership and continued encouragement and support of the Live Better—Electrically program, which has brought great benefits to the electrical industry and the public it serves.

► A 250,000-kw coal-fired thermal plant in the Cle Elum coal area is found to be feasible economically by H. Zinder & Associates. They recommended that the Kittitas County PUD of Ellensburg enter into immediate negotiations with prospective power purchasers and initiate negotiations with BPA for integration of the power from the plant into the Northwest Power Pool. Estimated cost of the project is $50 million.

► The proposed Cowlitz River hydroelectric development by Tacoma City Light will cost a minimum of $153,000,000, according to a preliminary report submitted to the utility by Harza Engineering Co. of Chicago. This represents an increase of 5.2% over the estimate prepared in 1951. The development envisages two power plants, Mayfield (160,000 kw) and Mossyrock (300,000 kw).

► Another Central Valley irrigation district has helped to solve its water supply problems by enlisting the cooperation of the Pacific Gas and Electric Co. Brown's Valley Irrigation District in Yuba County has reached an agreement with the utility which assures construction of the Virginia Ranch reservoir project. PG and E has agreed to enter a long-term contract for the use of Brown's Valley District water in the existing Colgate and Narrows power houses on the Yuba River. Income from PG and E's payment for the water will help repay the loan necessary to construct the dam, reservoir and related water distribution facilities costing about $4 million.

► Two Westerners are on an Ad Hoc Advisory Committee on Reactor Development appointed by the AEC. They are James B. Black, chairman of Pacific Gas and Electric Co., and Eugene Starr of Bonneville Power Administration.

► Helena, Mont., plans a special improvement lighting district covering 35 blocks of older residences in the city's West Side. The city commissioners are working on a contract with Montana Power Co. for the installation of approximately 160 4,000-lumen fixtures in streets and 31 2,500-lumen fixtures in alleys. The new system will replace a system installed more than 30 years ago, the city paying 25% of the cost and the property owners the remainder.

Growth

Open Motors Used

Southern California Edison is experimenting with the use of open motors on a pipeline that transfers fuel between Alamitos and Huntington Beach power plants.

Three 400-hp oil pumps and three 100-hp pumps are required on the system, and one each of the open motors will be used. The others will be of the enclosed, weather-protected type.

The cost of the open motors is about 30% less than the enclosed type, and they are said to offer further saving through easier maintenance. Allis-Chalmers Super Seal open motors are being used.

► Washington Water Power Co. has awarded the final contract in connection with the relocation work at Noxon Rapids Dam. The contract was let to Bud King Construction Co., Missoula, Mont., on a bid of $52,000. The contract marks the final step in about $21,000,000 worth of relocation work. Noxon Rapids is now about three-fourths complete.

► Chugach Electric Assn. has received a low bid of $237,640 from American Elin Corp. of New York City for furnishing two 10,500-hp Francis-type turbines for its Cooper Lake hydroelectric project. American Elin, a subsidiary of a European manufacturing firm, underbid the lowest U. S. bidder by more than $70,000.

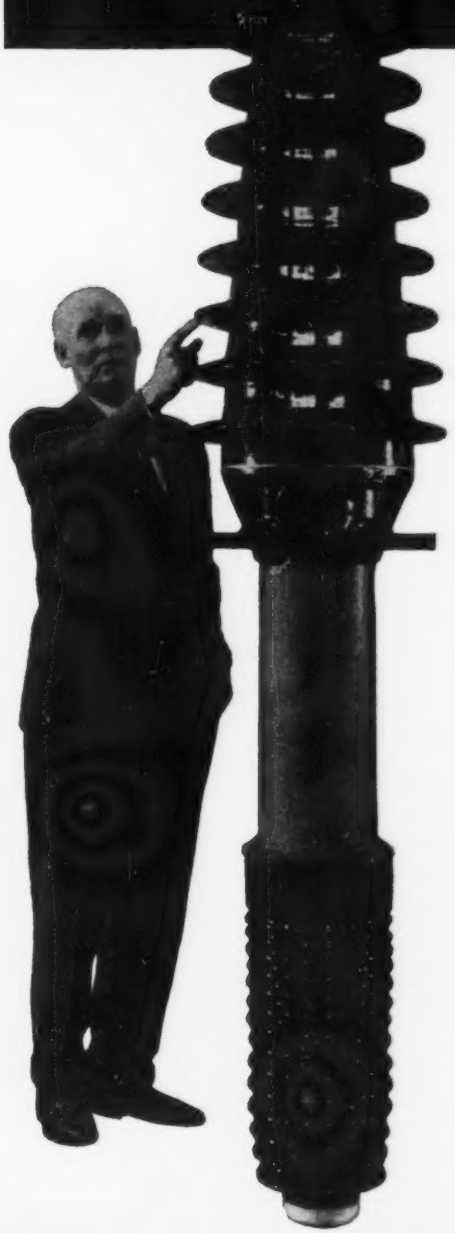
► Total storage in eight major power reservoirs of the Columbia River basin at the end of October was about 1,834,000 acre-ft more than last year, and about 3,853,000 acre-ft more than the seasonal average in the 1947-1956 period.

► Pasadena Light & Power Department is now completing its second 34-kv transmission line to east Pasadena.

► Los Angeles Department of Water & Power is currently testing the first 160,000-kv unit at Scattergood steam plant. It will go on the line early this month.

Westinghouse Type "O"... only service-proved ASA bushing

Includes ratings 92 through 196kv



Westinghouse Type "O" bushings have an unmatched service record—demonstrated by over 300,000 bushing years of trouble-free service. Because new ASA dimensional requirements were achieved with no basic change in design, this is the only ASA bushing that is service-proved. Type "O" bushings offer plus values derived from over 50 years of Westinghouse leadership in condenser bushing design. Continuous research and development—made possible through PLOWBACK OF EARNINGS by Westinghouse—have produced these extra bushing features:

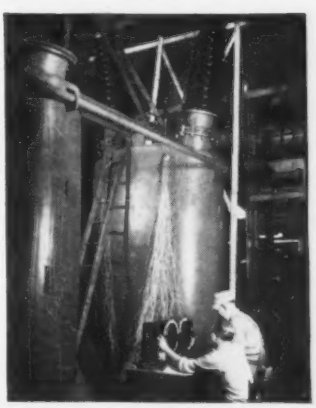
Exclusive, fully insulated potential device tap, unchanged dimensionally for 25 years, provides standard cable connection for any Westinghouse potential device. Does not have to be grounded —thus valuable bushing insulation is fully used at all times.

Extra interchangeability is achieved, in addition to the interchangeability with other manufacturers' bushings provided by ASA dimensions. Westinghouse ASA transformer bushings are designed to permit direct replacement of many older bushings. Westinghouse ASA circuit breaker bushings can be made interchangeable with flange and stud adapters.

Inventory savings are now possible: With Westinghouse ASA bushings as spares, bushing stocks can be reduced to a minimum. No adapters are required for most Westinghouse transformers.

Ask your Westinghouse representative about the ASA Type "O" bushings . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-70880

YOU CAN BE SURE...IF IT'S Westinghouse



The superiority of the Westinghouse one-piece weather casing of wet-process porcelain is pointed out by Bob Rung, Transformer Components Sales Manager. Loaded in compression only, it provides the Type "O" bushing with exceptional mechanical strength.

Repeated testing of Type "O" bushings as part of high-voltage power circuit breaker development program proves the superior mechanical and electrical strength of these bushings has been maintained in achieving interchangeability, as provided by new ASA standards.

Association Affairs

Springtime in The Rockies

The Rocky mountains will rock during the last week in April when Denver stages Colorado's centennial celebration to be known as the "Rush to the Rockies." Electrically it will be a busy time as well.

Rocky Mountain Electrical League plans to hold its spring conference during that week. The Rocky Mountain Electrical Manufacturers Representatives Club Inc. has decided to stage its second electrical show that week. The National Association of Lighting Maintenance Contractors

Calender of Meetings—1959

FEBRUARY

2- 6—*Western Winter Market*, Western Merchandise Mart, San Francisco.

8-14—*National Electrical Week.*

12-13—*Pacific Coast Electrical Assn.*, Business Development Section conference, Hotel Sheraton-Palace, San Francisco.

13—*Intermountain Electrical Assn.*, annual conference, Hotel Newhouse, Salt Lake City.

14—*Snake River Valley Electrical* Assn., annual conference, Boise.

MARCH

24-26—*Electrical Maintenance Engineers Assn. of So. Calif.*, biennial conference, Los Angeles, Calif.

30-31—*PCEA*, Engineering & Operating Section conference, Hotel Lafayette, Long Beach.

APRIL

8- 9—*PCEA*, Administrative Services Section conference, Hotel Lafayette, Long Beach.

19-21—*Rocky Mountain Electrical League*, spring conference, Continental Motor Hotel, Denver.

22-24—*Northwest Electric Light & Power Assn.*, Engineering & Operating Section, Purchasing Committee, Hotel Utah, Salt Lake City.

24-29—*Bureau of Home Appliances of San Diego County*, spring conference, also Spring Fair, Balboa Park, San Diego.

26-May 1—*International Association of Electrical Inspectors*, annual meeting of Idaho, Utah, Montana and Nevada Chapters.

27-29—*National Assn. of Lighting Maintenance Contractors*, annual conference, Hotel Cosmopolitan, Denver.

MAY

6- 8—*Institute of Radio Engineers*, regional conference and trade show, University of New Mexico, Albuquerque.

11-12—*Illuminating Engineering Society*, Intermountain region conference, Hotel Continental, Denver.

20-22—*PCEA*, annual convention, Hotel Fairmont, San Francisco.

25—*Northwest Public Power Assn.*, annual membership meeting, Hotel Olympic, Seattle.

26-29—*IES*, Pacific Northwest region conference, Banff Springs Hotel, Banff, Alberta, Canada.

26-28—*American Public Power Assn.*, annual national convention, Hotel Olympic, Seattle.

—*National Electrial Contractors Assn.*, joint conference of Districts 6, 8 and 9, Glacier Lodge, Glacier National Park.

JUNE

22-26—*Western Summer Market*, Western Merchandise Mart, San Francisco.

22-26—*American Institute of Electrical Engineers*, Pacific general meeting, Hotel Olympic, Seattle.

28-July 3—*Los Angeles Market*, Los Angeles Furniture Mart.

AUGUST

10-13—*International Association of Electrical Leagues*, annual conference, Hotel El Cortez, San Diego.

18-21—*Western Electrical Show and Convention*, Cow Palace, San Francisco.

24-26—*International Association of Electrical Inspectors*, Northwestern Section annual meeting, Seattle.

31-Sept. 3—*IAEI*, Southwestern Section annual meeting, Hotel Flamingo, Santa Rosa, Calif.

SEPTEMBER

7-11—*Illuminating Engineering Society*, National Technical Conference, Mark Hopkins and Fairmont Hotels, San Francisco.

—*Northwest Electric Light & Power Assn.*, annual convention, Hotel Vancouver, Vancouver, B. C.

25—*Intermountain Electrical Assn.*, Fall Dealer Conference, Newhouse Hotel, Salt Lake City.

OCTOBER

25-29—*RMEL*, annual convention, Broadmoor Hotel, Colorado Springs.

NOVEMBER

—*PCEA Hawaiian conference*, Honolulu, T. H.

27-Dec. 2—*San Diego Bureau of Home Appliances*, annual Electrical and Home Appliance Show, Electric Building, Balboa Park, San Diego.

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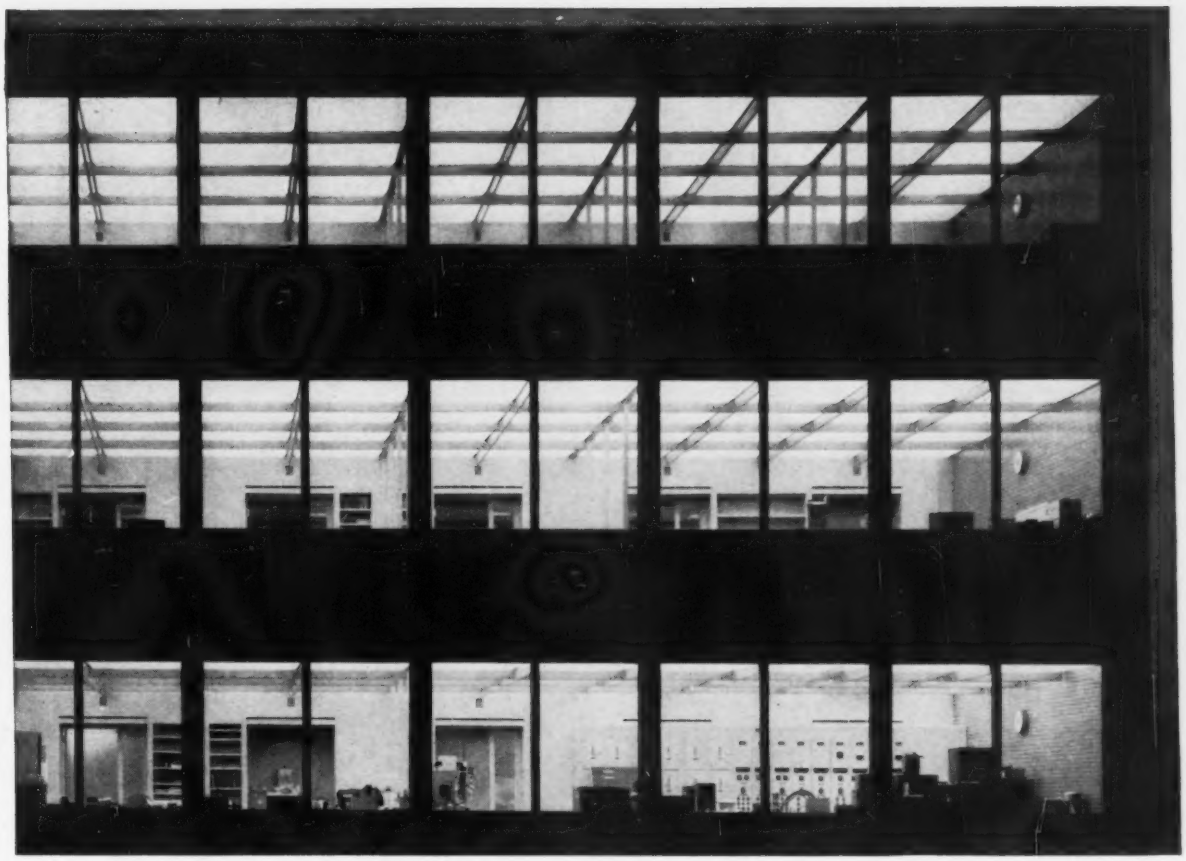

When you are asked to help out with a customer's lighting problem, you'll find us ready and willing to discuss with you the latest ideas, methods and information available from any one source,—Graybar!

For assistance in the selection of equipment for any lighting system . . .

MERCURY ☐ INCANDESCENT ☐ or FLUORESCENT ☐

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Every working day brings you questions from architects, electrical contractors, commercial establishments and industrials concerning the right lighting source and equipment to use for some particular installation. Always remember, you can supplement your own broad knowledge and experience through that of our Lighting Specialists,—men who have contributed to the planning of thousands of installations across the country. Graybar's roots are deep in the lighting industry, and ours is a mutual interest—better lighting for all.

Next time you have a knotty lighting problem, call your nearby Graybar office. Back up your dealers and contractors with the best of the current ideas selected from up-to-date developments of the nation's leading equipment manufacturers whom Graybar represents. You'll help build your load through the kind of lighting that will contribute to better production schedules in industry, greater sales for your merchant customers, and greater living enjoyment in homes in your area.

690

CALL **GraybaR** FIRST FOR

Graybar Everything Electrical Graybar Electric Company

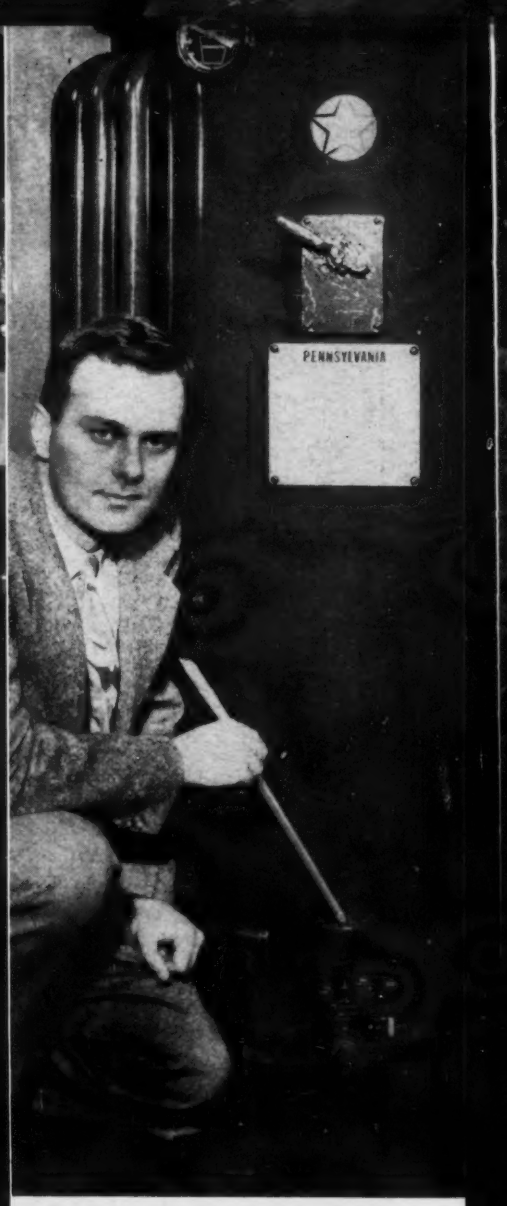
GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

4-step finish gives lasting protection

Thousands of installations have proved the long-lasting quality of the Pole Star four-step finish. It begins with shot-blasting of all external surfaces, to remove scale, grease and dirt, and to provide "toothage" for adhesion of the first coat of paint. Then, three coats of paint are applied. The first two are flowed on to assure complete coverage. The third, finish coat, is sprayed.

Freon gas test okays all seams

Gasketed and welded joints are checked with the highly reliable freon gas leak detection test. The transformer is placed under positive gas pressure with a charge of freon gas. If *any* gas leaks through the joints of tank, cover, or bushings, it is drawn into the electronic "sniffer gun" to an electronic detector circuit that actuates an alarm. If a leak is detected, the faulty seal is corrected and retested.



"Low-Set" valve drains <u>entire</u> tank

Intermediate-size Pole Star transformers are now equipped with the Pennsylvania "low-set" power transformer drain valve. Now, it is no longer necessary to tip the transformer or apply internal pressure to completely drain the tank. As a result, there will be no mixture of old and new oil—a precaution that can pay off in additional years of trouble-free service.

Controlled tube production pays off in quality

To maintain consistently high quality, the entire production of cooling tubes and radiators is handled in Pennsylvania's own plant. Facilities include a modern electric-weld tube mill. Details such as the welding coolant, seam quality, and storage procedure are under constant surveillance. Rigid control in the production of this important transformer component makes a difference as the years of service begin to add up.

Rugged base makes maintenance easier

Welded solidly to the tank, the base of intermediate Pole Stars has four large openings for ventilation, to prevent condensation on the tank bottom. These openings also facilitate cleaning and painting in the field. To facilitate jacking, base jacklugs extend either between or beyond tubes and radiators. The transformer can be rolled in any direction.

externally, too . . . you get power transformer ruggedness with intermediate

PENNSYLVANIA POLE STAR DISTRIBUTION TRANSFORMERS

250 through 500 kva

a product of

Pennsylvania Transformer Division

McGRAW-EDISON COMPANY

Canonsburg, Pennsylvania

McGRAW EDISON

POLE STAR

has scheduled its national annual conference for Denver April 27-29.

Jim Wall, Young Electric Co., is chairman of the show committee for the manufacturers representatives club. He has arranged that it will be the first major event in Denver's new Merchandise Mart which is being provided through the remodeling of the Daniels & Fisher Tower Bldg. Thirty per cent more booth space will be used for the show than was used last April at the Denver city auditorium.

NAED

An area meeting that almost assumed the proportions of a convention was held by the southern California members of National Association of Electrical Distributors at Palm Springs Nov. 11 and 12. More than 200 attended. Having missed the spring meeting due to the national convention in San Francisco, this area meeting made up for lost time. Ralph Rohrbach, Pacific Wholesale Electric Co., San Diego, regional NAED vice-president, attended. Sam Mesick, Los Angeles Wholesale Electric, was in charge of arrangements and Kenneth Rehwaldt, General Electric Supply, Los Angeles, was program chairman. Kenneth Hartley, Electric Corp., was elected area chairman for another term.

Speakers addressing the group included Jack Vance, McKinsey & Co.; Robert W. Jackson, General Electric Co., San Francisco; and Tony Whan, Pacific Outdoor Advertising.

A feature of one of the general meetings was a panel discussion on the need for better salesmanship. It was moderated by A. H. Gudie, Biddle Trade Publishing Co., Los Angeles, and the panelists were W. W. Vaughn, California Electric Power Co.; S. R. Breckhus, Drury Electric Co., San Bernardino; Harry Bohme, Kaiser Steel; and Clarence Gurr, Western Sales Co.

PCEA

PCEA's board of directors was represented at the fall Administrative Services Conference as follows: **Cost Relations** group—R. H. Gerdes, executive vice-president, PG and E; **Right-of-Way and Land**—J. P. Yates, executive vice-president, Bechtel Corp.; **Internal Auditing**—K. C. Christensen, vice-president and treasurer, PG and E; **Systems and Procedures**—A. J. Swank, vice-president, PG and E; **Investor Relations**—F. A. Tracy, president, Sierra Pacific Power Co.

R. P. Engel was appointed to the board to fill the unexpired term of **A. J. Schmitz,** who has resigned as a director because of his retirement.

Discussed at the session was the possibility, at some future time, of holding a **joint annual convention** for the Rocky Mountain Electrical League, the Northwest Electric Light & Power Assn. and the Pacific Coast Electrical Assn. It was agreed that PCEA President Hicks will correspond with officers of the other two organizations to get their views concerning such a joint convention.

Gordon F. Black, chairman of the **Business Development** Section, reported to the board on plans and activities of his section. He stressed the fact that all committees have been requested to consider the forthcoming Feb. 12-13 conference (scheduled at the Sheraton-Palace Hotel in San Francisco) as an interim report of the section. In this way, he said, committee interests and activities will be maintained through the entire year, culminating in a final report at the annual convention. Chairman Black announced that Fischer Black, editor and publisher of *Electrical World,* will be luncheon speaker at the conference on Thursday, Feb. 12, and the Friday luncheon will be presented by the Home Economics Committee. Editor and Publisher Black's topic will be: "Are Our Sales Forecasts Just a Dream?"

The Agricultural Electrification Committee plans to tape its entire conference program and make all illustrations into slides so that members of the committee can literally "take the talks out" to people who could not be present to hear them firsthand. The committee is also considering publication of a pamphlet for farmers and farm equipment dealers covering adequate wiring, overloading protection and safety for single-phase farm load.

The Heat and Air Conditioning Committee is planning to present a "heat pump workshop." If the response is favorable, the committee will follow up with a workshop on resistance heat.

IES

Inland Empire Chapter, IES, met jointly with the AIEE in Spokane Nov. 11. Paul Davis spoke on "Mercury Sources and Control Units." At the previous meeting members of the regional planning meeting were guests.

Utah Section heard Charles Amick, vice-president in charge of sales for Day-Brite Lighting, Inc. of St. Louis on Nov. 12. Amick then continued to San Francisco where he met with the general committee planning for the 1959 national technical conference in San Francisco.

San Jose Chapter has found that its Study Club preceding the regular meeting gives its members much desired technical information. At the Nov. 19 meeting George E. Ninnis, consulting electrical engineer, discussed "Design Functions and Economics of 277-V and of High Frequency Wiring Systems." The meeting itself heard J. Dugan, Pacific Coast manager, Jefferson Electric Co., Los Angeles, on "Right Selection of Ballasts for the Job" and Bernard Geerling, Western Division sales manager, Day-Brite Lighting Co., on "Lighting Fixture Manufacturer's Problems in Design to Accommodate Ballasts."

The San Jose Chapter is planning to make its annual garden lighting meeting really exceptional. With the cooperation of *Sunset* magazine, the meeting and display will be at *Sunset* magazine's gardens and offices in Menlo Park and the national technical conference will be guests to a tour of the gardens and display. Handling the arrangements for this are Stan Blois, general chairman; George Smedberg, design; George Harter, NECA, installation; and Matt Sherwood, NECA, publicity.

Golden Gate Section likewise has started a technical discussion session prior to the regular meeting. At its Nov. 20 meeting Karl E. Hoffman, Photoengraving Equipment sales engineer, discussed "The Use and Measurement of Light and Color in the Graphic Arts Industry." For the regular meeting John Gordon Campbell of Campbell & Wong, architects, presented his views on "New Directions in the Use of Light and Color in Contemporary Buildings."

Mother Lode Chapter, IES, in Sacramento, installed Charles A. Dean Jr., PG and E, as chairman of the chapter; Earl Storrs, Stockton consulting engineer, vice-chairman; and Elton Harris, Sacramento, secretary-treasurer, at its Oct. 20 meeting. Prof. Dan M. Finch, University of California, and Charles D. Gibson, chief of the Division of School Planning for the state, discussed the work of Dr. H. R. Blackwell, University of Michigan, into the lighting requirements for various seeing tasks. Finch cautioned that these figures were derived from limited research and should be used with good judgment. Gibson discussed the application to the future planning of lighting for schools.

Puget Sound Section, IES, likewise discussed the Blackwell research re-

26 different types of Day-Brite fixtures provide lighting adapted to ceiling and area functions for CONSUMERS POWER CO., Lansing, Mich. BLACK & BLACK, *Architects;* E. ROGER HEWITT ASSOCIATES, *Consulting Engineer;* LANSING ELECTRIC MOTOR, *Electrical Contractor.*

The tough lighting jobs go to DAY-BRITE

At Consumers Power Co., the lighting fixtures had to conform to each area, every situation. Fixture installation could have been a problem.

But not with *Day-Brite* fixtures, designed for smooth integration with standard ceiling assemblies by the developers of the Ceiling Indexing System.

Nearly all lighting problems can be solved more easily with stock Day-Brite fixtures and hangers. Let your Day-Brite representative prove it. You'll find his name in the Yellow Pages of your telephone directory.

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DECIDEDLY BETTER
DAY-BRITE
LIGHTING FIXTURES

Day-Brite Lighting, Inc., of Calif., 530 Martin Ave., Santa Clara, Calif.

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

port in an open panel discussion at the Oct. 27 meeting in Seattle. Three panels participated, one of architects, second of illuminating and electrical engineers, and the third of building managers and management design engineers.

Arrowhead Chapter of IES, the newest of the organization, was set in motion Nov. 4 at a meeting in Rialto near San Bernardino. Gordon Burgess of California Electric Power Co. was elected chairman; Jack Adams, vice-chairman; William Ritter, secretary-treasurer. Speakers of the evening were James Grant and Arthur Rowe of General Electric Co., Apparatus Sales Division, who discussed transformer and ballast problems.

San Diego Section heard about special lighting applications, particularly of explosion- and vapor-proof types, from Robert Johnson of Crouse-Hinds Co., Nov. 6. This group is planning to restore study clubs to the regular meetings.

EMEA

Electrical Maintenance Engineers Association of Southern California is running a four-ring circus these days with separate meetings each month for its Pomona, Los Angeles, San Fernando Valley and Harbor Area memberships. The Pomona area meeting Nov. 18 heard Wayne Patterson, application engineer, Permacel Tape Corp., discuss "Electrical Maintenance Applications for Silicone Rubber Tapes and Films." The Los Angeles central meeting at Rodger Young Auditorium heard John R. Eastman, chief engineer, Sterling Electric Motors, discuss "Controlled Acceleration Devices." San Fernando Valley meeting was shown a film presentation of the launching of Explorer I, "X Minus 80 Days." The Harbor Area meeting Nov. 20 heard Russell Gray, commercial representative of General Telephone Co., Long Beach, who showed a film of the golden 20s.

Inspectors

Southern California Chapter, International Association of Electrical Inspectors, meeting Nov. 5 at Long Beach, elected Ed Muller, safety engineer, Department of Industrial Safety, Los Angeles, as chairman of the chapter to succeed Sam Marrocco, Riverside city inspector. At a previous meeting of the chapter Muller questioned the members regarding the feasibility of a uniform code and committees were set up to cooperate with Orange County, Los Angeles County and the PCEA in preparing a uniform code for the area. Other members of the committee, of which Muller is chairman, are Clyde Soden, wholesaler, Riverside; Ben Wheater, former Long Beach inspector, now with Blakeman Bros.; Harry Dobson, former Santa Barbara inspector, now consulting engineer; Jesse Ross, San Bernardino city inspector; Walter Reed, Orange County inspector; Martin Luskin; and Archie Prouty.

Arizona Chapter met Nov. 8 at Tempe. Paul Wycoff, building and electrical inspector of that city, presided as chairman in the absence due to illness of Cecil Clark of Tucson. Next meeting is scheduled Jan. 10 in Yuma.

Central California Chapter, IAEI, met Nov. 15 at Westinghouse Electric Supply Co. offices, Fresno, under Charles R. Pierce, chairman. Truman W. Ball, Economy Fuse & Mfg. Co., discussed Amtrap fuses for high-interrupting capacity applications. Philip L. White, chief electrical inspector, Bakersfield, presented pictures of electrical fires and their consequences.

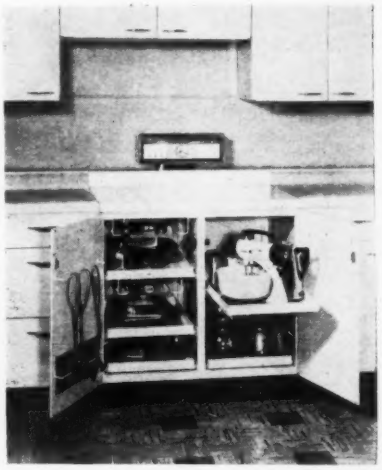
Electric Clubs

Fourth anniversary of the founding of the Snake River Valley Electrical Assn. was celebrated Oct. 26 in Boise. Its present president, Paul W. Worthen, General Electric Co., Boise, was one of the original incorporators. Latest innovation is a SRVEA symbol being used in newspaper advertising by dealers, appliance repairmen, electrical contractors and electronic servicemen, especially in the Boise or Central Chapter area. This chapter has started a 24-ad series in the Boise papers. The chapter recently sponsored a field trip to the Brownlee and Oxbow Dams being constructed on the Snake River in Hells Canyon by Idaho Power Co.

► **Sacramento Valley Electric League** has had a busy program of meetings. It heard on Nov. 5 Gordon D. Schaber, dean of McGeorge College of Law, talk on law that governs small business. On Nov. 22 it toured the Aero Jet plant and on Dec. 6 will hold its 12th annual Christmas party at El Dorado Hotel.

► **George Tenney,** president of Electrical West and vice-president, McGraw-Hill Publishing Co., presented long-range views into the future of the industry and the West at **Los Angeles Electric Club** and **San Francisco Electric Club.**

Market Development



This automatic control panel and small appliance center has been introduced by Sunbeam. Providing push-button circuit breakers, the control panel comes in four models, ranging from $39.95 to $69.95: two six-outlet and two four-outlet units. All but one model has a clock timer. The cabinet holds 15 appliances; has pull-out shelves. Panel can be mounted on cabinet as shown or in the wall or against it

Exhibit to Tell Electrical Story

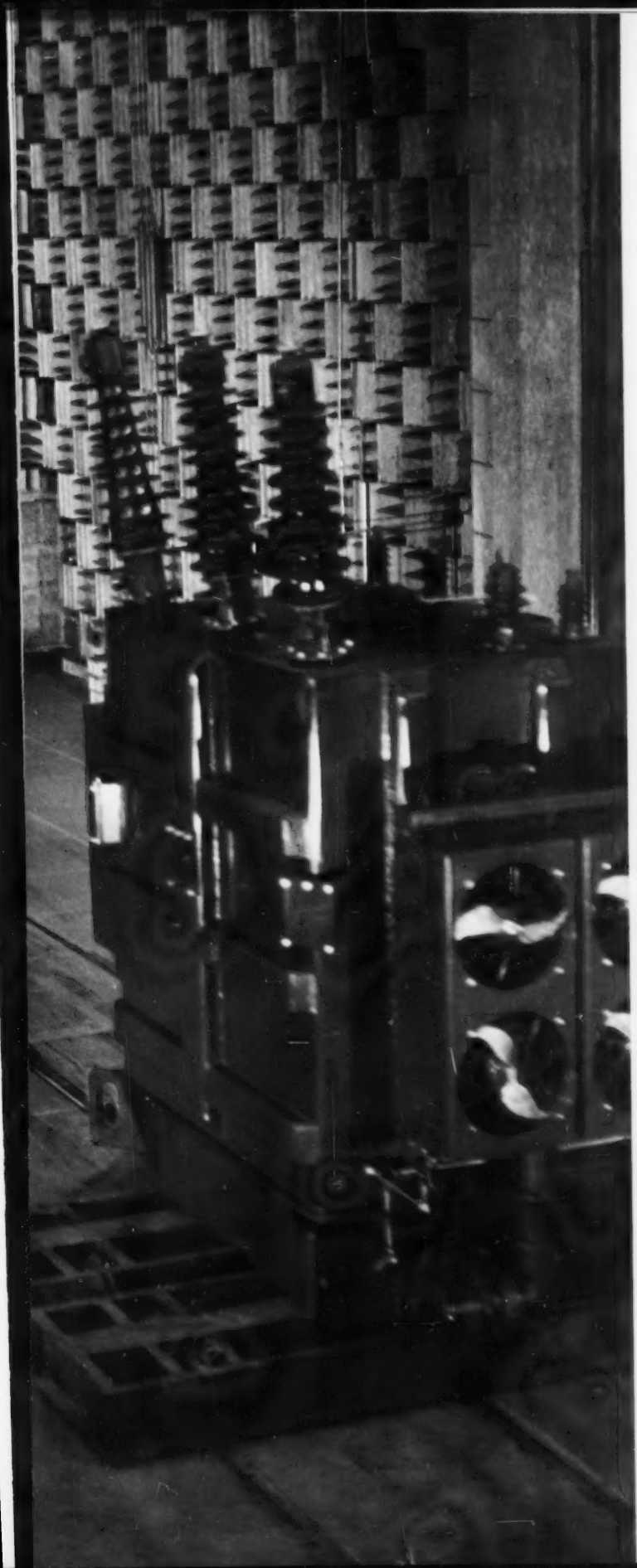
Portland General Electric Co. will display its own "thunderbolt" brand as the capping feature of a $60,000 exhibit it plans for the 1959 Oregon Centennial Exposition and International Trade Fair. The bolt will course through a 100-ft tower on top of the exhibit building.

PGE's exhibit will be among leading attractions for the 100-day centennial show running from June 10 to Sept. 17, 1959, as a part of the state-wide celebration observing the 100th anniversary of Oregon's admission to the Union.

Plans for the exhibit call for a triangular shape, Brussels-fair-type building in which a complete electric system will be simulated in miniature.

The interior diorama will include a reservoir, actually being filled by falling rain, behind a 13-ft-high model dam. The model will include a cutaway generator and waterwheel that will show how electricity is generated by the weight of falling water.

The display will also show trans-



To meet your load demands before they arise

INDUSTRY'S MOST COMPLETE POWER TRANSFORMER TEST CENTER . . . ANOTHER EXAMPLE OF EARNINGS PLOWED BACK

Since its inauguration in November, 1956, the power transformer test center has extended the ability of Westinghouse to provide equipment with the capacity to meet the needs of the electric utility industry before they arise.

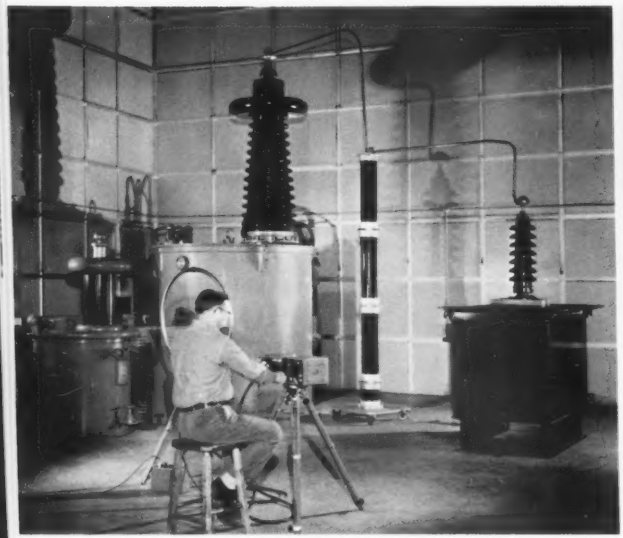
Such technical advances as more capacity in single units, reduction of vibration and noise, new insulation systems, and materials with greater endurance limits emerge from these facilities—not as ideas or experiments, but as scientifically designed, tested and proved realities.

In noise testing, for example, an anechoic chamber, roughly the size of a five-story building, cuts out extraneous sound so that exact levels of transformer "hum" may be measured and studied. This giant vault, designed to accommodate transformer ratings foreseen for the next decade, provides data which promise development of transformers that will be smaller, quieter, lighter and more capable.

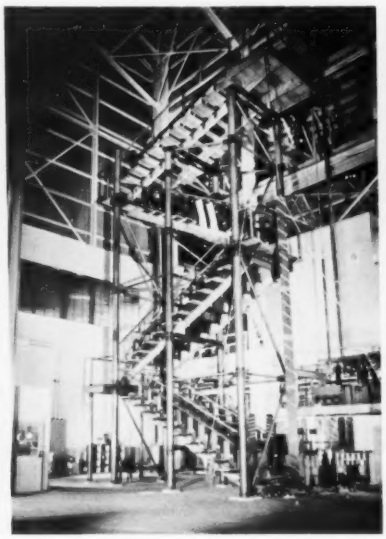
YOU CAN BE SURE...IF IT'S

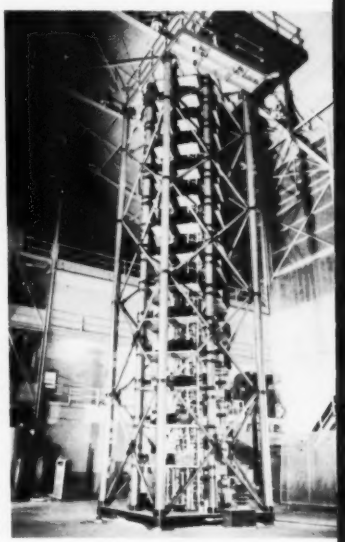
Westinghouse

Equipment at the test center designs and proves Westinghouse power transformer superiorities



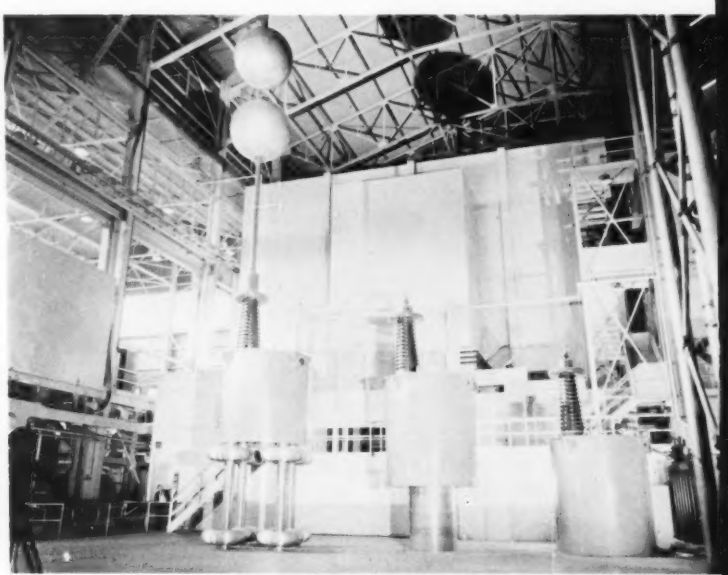
Radio influence tests on power transformers are made to determine means to minimize interference with all types of electronically controlled equipment, from television receivers to aircraft fire control. These tests are also employed to study effects of ionization on insulation.





Impulse generators to test the dielectric strength of insulation range in capacity from 400,000 volts to 5,200,000 volts. In the present trend toward larger transformers with higher voltage and kva ratings, these tests provide vital information for the development of reduced insulation levels—resulting in smaller, lighter transformers, with greater capacity.

A three-unit cascade system, producing 1,050,000 volts, is used in low-frequency testing of insulation. Above the high-voltage unit of the system are two 200-centimeter spheres, positioned there to obtain the clearances required by sphere gap standards, for normal dielectric and impulse tests.



For full information on developments which are daily increasing our capacity to make your transformer investment a better one, call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

JI-97228-2

YOU CAN BE SURE...IF IT'S Westinghouse

mission facilities. Downstream from the model dam will be a presentation of park and recreational facilities in conjunction with hydroelectric projects.

A second point of the exhibit will be a presentation of industrial uses of electricity with live demonstrations of electricity being used to turn out products.

The electric power utilization section of the display will also feature commercial, farm and residential uses of electricity.

A climax to the interior diorama will be a display of the latest in electrical appliances.

The building is being designed by Donald Blair, Portland architect, and the display firm of Charles L. Wakefield is in charge of constructing the diorama. Rollie J. Gabel, PGE director of promotion, is coordinating the exhibit for PGE.

Promotes Sun Switches

Washington Water Power Co. has begun an intensive merchandising program, to be handled through dealers, on automatic sun switch controlled area lighting for farms, according to Don Jordin, WWP farm sales supervisor.

Jordin said that the goal of WWP in the sales campaign is to sign up 10% of the company's rural customers for sun-controlled lighting in the next 2½ years. That would be about 1,000 customers. Each light, with a 295-w bulb, is worth about $15 per year in EAR.

Fixtures being merchandised are Line Material, General Electric and Westinghouse. These companies are cooperating in the effort by contacting their dealers to get them to stock the fixtures. The effort is being coordinated through the Inland Empire Electrical League farm committee, of which Jordin is chairman.

Public Taken Behind Scenes

Giving the public an opportunity to see how electricity is brought to industries and homes for better living electrically, Los Angeles Department of Water & Power staged a three-day open house at its neighborhood distributing station 55, in the Wilshire-La Brea area.

Late model appliances were demonstrated and refreshments served in a program planned for adults and children. Department engineers were on hand to serve as guides and to explain complex workings of equipment in a station capable of serving a community of 80,000.

One of the slickest devices to come along in some time, especially for street light controls, is the cadmium sulfide photocell. But like anything else, what you get out of it depends pretty much on what you put in, by way of application care and common sense. Here are some things we've learned over the last four years, trying to get maximum reliability in a new control built around a CdS cell.

Running a CdS cell on *AC* calls for a relay with better-than-average sensitivity and precision, and this has caused some to sidestep the problem by using a DC relay in a DC circuit. But then the combination of the DC and the high light levels involved gives the cells a kind of electrically lopsided personality, making drift a real problem. We've stuck to AC, and our affiliate company has answered the relay question by designing one especially for the job.

You also have to keep close tabs on *how much power* a CdS cell is required to dissipate. Boosting dissipation but a fraction of a watt over the cell's rating (in control circuits, at room temperature) cuts down cell life from a period of years to a few months; on top of this, temperature increases make matters even worse. So in our new 6600A Series controls, dissipation has been held to a conservative minimum.

To give the cells every other operating advantage we could think of, we also buy *average* sensitivity cells because they remain more stable than high sensitivity types; *pre-age* them, to improve their stability still further; use *hermetically sealed* cells to avoid the ravages of humidity; *shield* them from the sure death of sunlight (by designing the control to operate facing north); and insist that they meet rigid specifications when we get them, as insurance against a whole flock of future problems.

We are not saying this is the *only* way you can build a reliable CdS photocell control. But hitching a cell to some kind of switch and dropping a little cover over the works isn't our idea of the way to make street lights turn on and off with certainty, year after year . . . or the way to stay in business, for that matter.

The Fisher-Pierce Co., 43 Pearl Street, So. Braintree 85, Massachusetts.

FP

FISHER PIERCE

PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

A professional model shows that this dress is really ready to wear when it comes out of an automatic washer. Kathleen Brick of San Francisco, Lever regional home economist, was commentator for this feature of Puget Power's Electrical Living Workshop

Home Ec Workshop

An Electrical Living Workshop for home economists was sponsored by Puget Sound Power & Light Co. in the auditorium of its Bellevue headquarters building on Nov. 1. With attendance limited to teachers and professional home economists, more than 100 were present.

The program was arranged by Edith T. Rauch, Puget Power's home service director, who said that this was the first such workshop in the area under utility sponsorship.

A Wash-N-Wear Fashion Show was one of the features of the day-long meeting. Four professional models attired in Wash-N-Wear dresses, paraded across the stage to an automatic washer. They then took off the dresses and stowed them into the washer. Later, after the dresses were washed and dried, the models put them on and displayed them again, to the running comment of Kathleen Brick of San Francisco, regional home economist for Lever Bros.

Other participants in the program were Dorothy Ramsland, assistant professor of home economics at the Western Washington College of Education, Bellingham; Luci La Fontaine of San Francisco, regional home economist for the Calgon Co.; Mary Kelley, San Francisco, regional home economist of the Philco Corp.; and Betty Buettner of Louisville, Ky., home economist of General Electric Co.'s Consumer Institute; Edna Poyner, San Francisco, Norge regional home economist.

Weather Too Good

Because the weather has been "too good" Portlanders haven't stepped up their electric use in 1958 at the usual rate. Portland General Electric Co.'s board chairman, Thomas W. Delzell, reported that rate of increase in home use of electricity is the lowest in 25 years.

Last winter the weather was so mild that heating requirements dropped 16% and in the summer the days were so clear everybody went on picnics instead of staying home and using electricity. Average annual use for the 12 months ended Sept. 30 was 8,383 kwh as compared with 8,430 kwh for the same period of 1957.

But the situation looks good for the future. Delzell reported a recent market survey revealed that 35% of PGE's customers are planning appliance purchases—a heavier market potential than ever recorded in previous market surveys.

► **National Electrical Week,** to be held Feb. 8-14, will have as its theme this year "Electricity Builds Jobs." N. J. MacDonald, president of Thomas & Betts, is chairman of the industry "umbrella" program this year.

Twenty-nine Amana dealers ready to leave San Francisco airport for a seven-day stay in Paris—their reward for outstanding sales performance in 1958. In Los Angeles 39 others joined the group. Nationally 350 took the trip as guests of the manufacturer

New Warranty

Westinghouse has announced it will offer a 90-day warranty on labor and parts for all its TV and high fidelity products.

E. J. Kelly, manager of the company's TV-Radio Division, said the warranty is being offered on a voluntary basis to distributors, who will administer the new policy locally. The one-year TV picture tube warranty will continue in effect under the new policy, he said.

Overcoming Resistance

A course in "Selling Against Resistance" was presented by the San Diego Bureau of Home Appliances in six morning sessions during September. The course was developed by Dan Turner, sales training director.

Subjects included: (1) How to overcome objections unobjectionably; (2) how to have your customer

Up to 163 Degree Spread — Up to 236,000 Candlepower: Now in

New CROUSE-HINDS Mercury Floodlights

Plus 6 Outstanding Advantages Never Before Offered in Mercury Floodlights of this Wattage

New—700 to 1,000 watt mercury floodlights with the widest beam-spread on the market . . . up to 163°. Or the brightest . . . 236,000 candlepower concentrated in a 75° solid angle! Complete with ballasted assemblies that will start lamps at –30° F. offering a further choice of three different reflectors and four different lenses (including a spun-sealed plate glass lens) to adjust the beam-spreads and candlepowers to your particular needs. All using either clear lamps for brightness, or phosphor-coated lamps for color enhancement. And all offering rear-door relamping and positive locking in open position.

Mercury Floodlighting Is Here to Stay

No other floodlight lamp approaches mercury for long burning hours . . . for economy of cost and labor in relamping. And no other mercury floodlight approaches these new MVF's for convenience of relamping, aiming, utilization factor and maintenance of output over a long period of burning. Other lights in the Crouse-Hinds range of floodlights from 250 to 700 watts provide varying beam spreads, intensities and efficiencies.

* For assistance in computing the exact fixtures, wattages and footcandles for your needs, consult your Crouse-Hinds distributor or the Illumination Department at the Factory.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

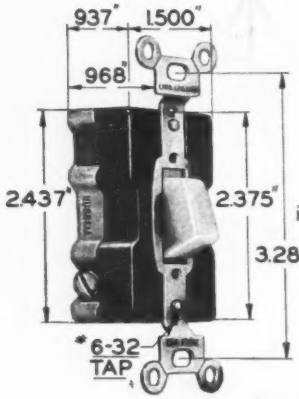
• CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) • FLOODLIGHTING
• TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT •

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Atlanta Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington **Resident Representatives:** Albany Baltimore Charlotte Chattanooga Reading, Pa. Richmond, Va.

Quality... you can put your finger on...

A. C.
presSwitch
TRADEMARK
with lighted button

No stumbling or fumbling in the dark to find this switch. A tiny, subminiature, neon bulb in the button is always "on" when the switch is "off", showing you right where it is, day or night. It's the last word in switch safety, luxury and convenience, .. and it costs only pennies a year to operate.



This lighted button "Presswitch" is the latest in Hubbell's complete line of "Presswitch" units, now available both lighted and unlighted and in 15 and 20 ampere ratings. All "Presswitch" devices fit standard boxes and utilize standard wall plates. No special wiring is involved.

CAT. NO. 1257-I
15 amperes, 120 volts,
A.C. Single-pole,
with lighted ivorine button
and feed-thru terminal

HARVEY HUBBELL, INC.
HIGHEST QUALITY
WIRING DEVICES • MACHINE SCREWS

WIRING DEVICE OFFICE AND WAREHOUSE LOCATIONS
Bridgeport 2, Connecticut
State and Bostwick Streets
Chicago 7, Illinois
37 South Sangamon Street
Los Angeles 12, California
103 North Santa Fe Avenue
San Francisco, California
1675 Hudson Avenue
IN CANADA:
Scarborough, Ontario
1160 Birchmount Road

Dept. R-1 BRIDGEPORT 2, CONNECTICUT

like you, stick to you and trust you; (3) how to have your selling points penetrate; (4) how to outsell competition; (5) how to tell your story; (6) how to close without tricks or traps.

Washers for Free

Graybar Electric Co., Los Angeles, will give away $10,000 worth of Norge Dispensomat washers on Dec. 13, winding up a promotional campaign with Safeway stores that began Nov. 15.

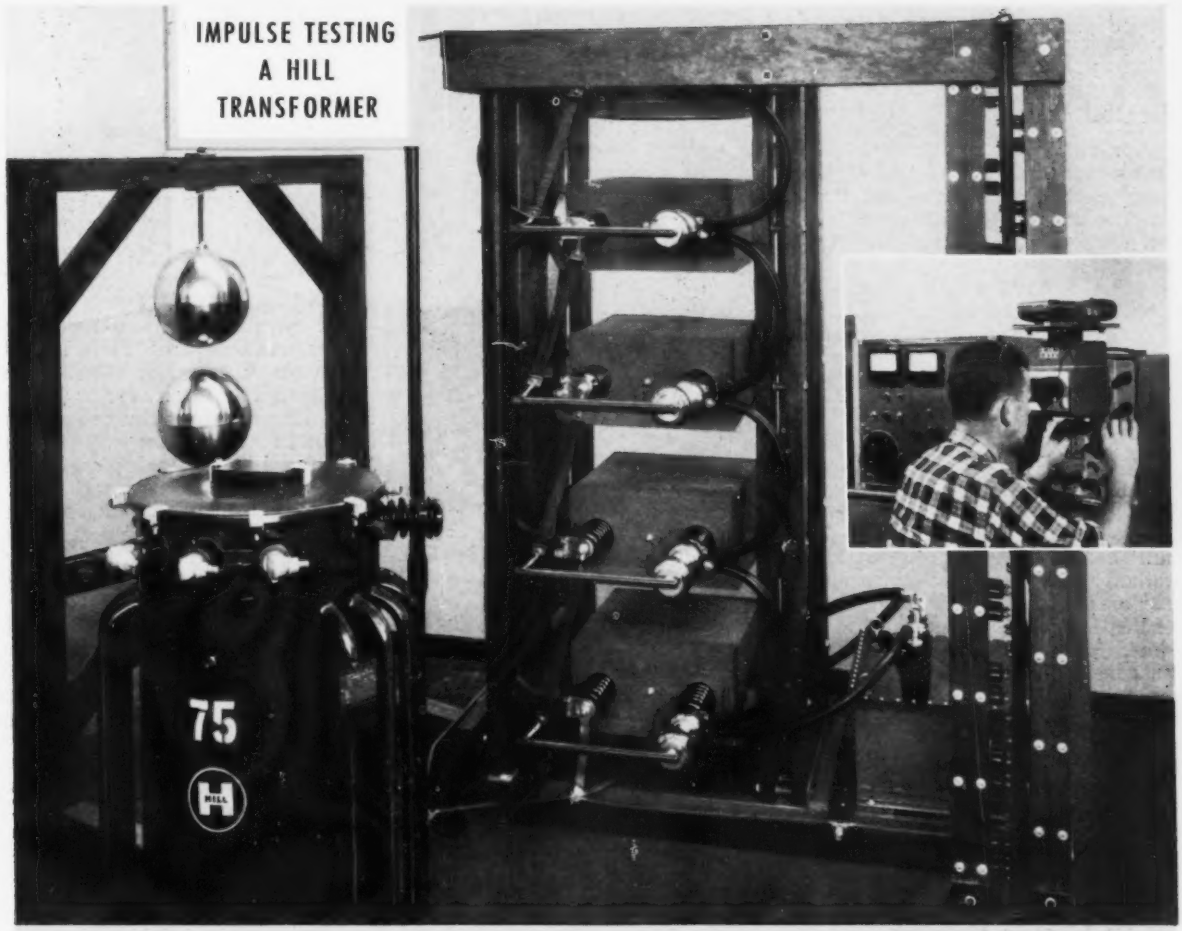
At the beginning of the campaign it was estimated that upward of 6,000,000 Safeway customers would register for the drawings for one of the 25 washers.

Safeway, which advertises in 130 southern California newspapers, featured the Norge giveaway in its advertising copy. In a promotional tie-in at various of the more than 200 Safeway markets in the area, cards of local Norge dealers were distributed.

Even before the campaign got under way officially, Graybar reported that as a result of preparatory banners and other promotional publicity washer sales had already experienced a marked increase.

► **O. M. "Bill" Williams,** active in appliance sales and distribution field on the West Coast for 23 years, has been appointed Hotpoint sales manager for Oregon and southwest

This modern "reader board" has been installed at the Puget Sound Power & Light Co.'s central division headquarters at Renton, Wash., to replace an older sign that bore simply the company's name. It is used to give sales messages for electricity and also to promote community events and worthy causes. Copy is changed weekly



HILL TRANSFORMER QUALITY PROVEN BY IMPULSE TESTING

HILL'S TESTING FACILITIES confirm that the quality built into Hill Transformers results in dependability.

All transformers must pass NEMA-ASA tests—plus Hill's own high standards.

HILL'S ADVANCED ENGINEERING DESIGN—executed by experienced, highly-trained transformer specialists—is proven in the testing lab to produce "transformers that stay in service"...the standard of production at Hill.

NOW AVAILABLE TO UTILITIES in complete standard range. Distribution transformers...3 to 500 KVA...in regular production. Power transformers...through 5000 KVA ...available on order. Oil-Immersed, Askarel-Immersed and Dry Types.

Hill's complete, new, Oil-Immersed Distribution Transformer Catalog is now available. Request Catalog #2000.

HILL

HILL TRANSFORMER CO., INC.
1030 WASHINGTON STREET
SAN CARLOS, CALIFORNIA

Washington. He succeeds **Orville Ransom,** assigned to the San Francisco office of Hotpoint.

Elected Trustee

Leonard Hobbs, vice-president, Smoot-Holman, Los Angeles, has been elected to a three-year term on the board of trustees of the Reflector and Lighting Manufacturers Assn. He was in Chicago for the recent RLM meeting and also attended a conference of NEMA's industrial, commercial lighting equipment division, where it was decided that the Eye-Fi trademark may be used by schools and in connection with the certified lighting program by NEMA members.

Area Development

A $1,500,000 steel mill will be built at Waiau by a group of Hawaiian and Canadian businessmen, it was announced last month by Leslie A. Hicks, president of Hawaiian Electric Co. The new firm, Hawaiian Western Steel, will provide reinforcing rod and other products for the construction industry. This is the second big project spurred by HECO's area development program, the first being Kentron Hawaii, an electronics firm. The utility has no financial interest in the steel mill but will supply power for the electric arc furnace.

For an Electric Holiday

Colorado Farm Power Council is concentrating education and promotion campaigns through Christmas on small appliances. Private utility and rural electric cooperative members are joining in the effort with attractive sales and countless home demonstrations.

Typical of the promotions featured throughout the state was a special price on the combination purchase of a Sunbeam all-purpose cooker, a frybasket and a frypan. The regular retail value of all three was $52.85. They were offered exclusively to rural families for $30.95, a saving of $21.90. The promotion included newspaper advertising by power companies, rural electrics and mailings to consumers.

► **Boyd Distributing** Co. Inc., 1661 W. Third Ave., Denver, has been appointed distributor for Sylvania television, radio and phonograph products in the region. Cecil H. Boyd, R. L. Brown and William H. Pearce of the firm attended conferences at Sylvania's Batavia, N. Y., factory on the region's merchandising program.

Oven pulls out for easy cleaning on top models in the new Frigidaire line. Top lifts off so that even back wall is accessible

'59 Line Shown

Appliances "engineered and styled to the tastes of a Queen" were shown to Frigidaire dealers in a series of dinner meetings last month. A lacework styling and added conveniences on new models were shown in pictures and "live" in a fast moving show that emphasized this year's theme, "Designed With You in Mind."

► **William E. Kress,** former Philco Corp. executive, has been appointed a vice-president and director of Mountain Appliance Distributors Inc., Denver. The firm is distributor for Philco products in the Rocky Mountain states. Kress started with Philco in 1934 as a salesman in the Chicago branch. He later was Southwest division manager and midwest sales manager, and at the time of his retirement was Western marketing manager.

Manufacturers—Distributors

Expands in Canada

Federal Pacific Electric Co. has increased its holdings in Canada with purchase of Cemco Holdings Ltd. of Vancouver and its subsidiaries Cemco Electrical Mfg. Co. and Cemco Switchgear Ltd.

Cemco, which maintains plants at Vancouver, B. C., and Granby, Quebec, makes switchgear, air circuit breakers, panelboards, switchboards, motor control centers, air switches, load break switches, fusible equipment, bus supports, cable terminal potheads and related electrical equipment.

This acquisition, following closely on the recent purchase of its former Canadian licensee, Federal Pacific Mfg. Co. of Toronto, makes the firm the fourth largest electrical manufacturer in Canada, according to President Thomas M. Cole, who stated that the expansion of the Canadian operation would parallel the parent company's development in the United States. Canadian plants are now located in eastern, central and western market centers.

► **Albert W. Dudreck** has been named advertising and sales promotion manager of **Rome Cable** Corp.

► **Robert L. Bobo** was made vice-president-marketing and **Harry E. Knudson** Jr., general sales manager, in promotions announced by **Federal Pacific Electric** Co.

► **Southern States Equipment** Corp. recently announced management changes. **Olan Richardson** was elected chairman of the board and chief executive officer. **Glenn Mitchell,** former vice-president-manufacturing, succeeds him as president. **W. C. Mitchell** becomes executive vice-president and chief finance officer.

► **The Fowler Mfg.** Co., Portland appliance manufacturer, has been purchased by **Republic-Odin Appliance Corp.**

Test Trailer on Tour

S & C Electric Co. has made its first round trip to the West Coast with its new test trailer for service environment testing of power fuses, load interrupters and cutouts. The new trailer reduces setup time and provides for testing at any place, day or night, and in any weather.

In addition to the ordinary magnetic oscillograph, it has a cathode-ray oscillograph enclosed in a magnetically and electrostatically shielded enclosure for recording high frequency phenomena.

It has complete electrical gear, including sequencing and timing equipment for long-period usage; water storage, bottled gas heat, water heater and a 10-kw voltage regulated power source for instrumentation, lighting and other electrical equipment.

Wide windows on two sides and

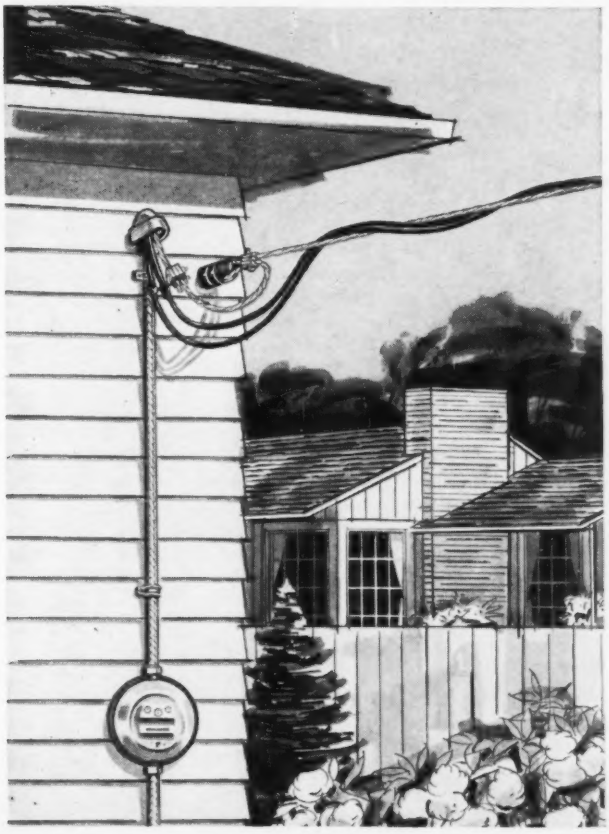
NOW! LOOK HOW MUCH YOU SAVE BY SWITCHING FROM COPPER TO ALUMINUM SE-U!

COST COMPARISON—ALUMINUM VS. COPPER

Service Entrance Cable
Concentric Uninsulated Full Neutral, Braid Jacketed
Underwriters' Type SE, Style U, 75° C. Operation

SERVICE		ALUMINUM		COPPER		SAVINGS WITH ALUMINUM	
Amperes	Feet	Conductor Size AWG	Cable Cost $	Conductor Size AWG	Cable Cost $	$	%
100	20	2	5.50	3	9.10	3.60	40
.....	40	2	11.00	3	18.20	7.20	40
.....	60	2	16.50	3	27.30	10.80	40
150	20	2/0	9.46	1/0	21.48	12.02	56
200	20	4/0	12.80	3/0	30.28	17.48	58

NOTE: Based on prices in effect as of September 15, 1958.



Check the table... at today's prices, braided aluminum SE-U saves you money over copper right down the line!

Note that the cost of #2 aluminum SE-U is *40% lower* than #3 copper SE-U. With the trend toward larger sizes, savings with aluminum become even greater—up to 58% for 200 ampere service! Neoprene jacketed aluminum cables offer similar savings.

FREE BROCHURE GIVES YOU THE FACTS

Our new, free brochure, *"KW Service Entrance Cable,"* points out the distinctive characteristics of both braided and neoprene jacketed aluminum cable, and fully explains why this cable offers definite advantages over copper.

It also describes and illustrates applications of SE-U Cable, as well as Single Conductor in Conduit, and contains a list of manufacturers of accessories for both applications.

Get your free copy of this informative 8-page brochure now. Mail the coupon!

KAISER ALUMINUM

IF IT CARRIES CURRENT, KW CARRIES IT!

Kaiser Aluminum & Chemical Corp.
Dept. 953
919 N. Michigan Ave., Chicago 11, Ill.

Please send your free brochure, *"KW Service Entrance Cable."*

Name_____

Address_____

City_____ State_____

EWe

one end give a 270° vista so the test supervisor may control all elements and instrumentation from a single bench.

Business Keeps Growing

Although Tubbs Electric, Spokane distributor, has been in its enlarged headquarters in Spokane for about a year, improvements are still being made for added convenience and efficiency. Started in one room in 1946, the firm has increased its space several times over the years. The latest addition is 42,000 sq ft of display, storage and office space on four floors.

A large appliance display room uses color and light to show both individual units and groups to advantage. Salmon and turquoise walls give a pleasing background for the appliances and one side of the room is in glass for window display if desired. Fluorescents are combined with floods, colored and white, to pick up features.

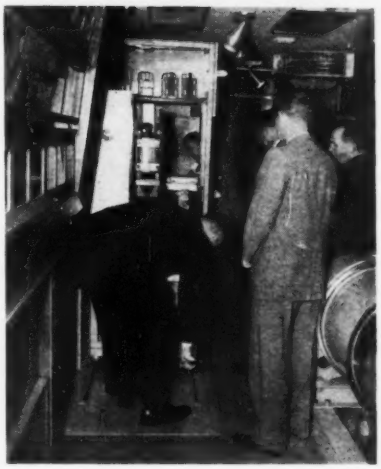
Clarence A. Tubbs reported that he has sold several lighting jobs modeled on the appliance room. His lighting fixture display is out in the open where it can be seen as the customer comes in. Handling a variety of lines, Tubbs believes in good display. He has recently issued an electric heat catalog and a new appliance catalog.

► **Roy C. Ritchart** has been named assistant chief engineer of Stromberg-Carlson, San Diego.

► **Ray J. Noel** Co. Inc. has taken on the complete Amplex lamp line for northern California and Nevada. Formerly Noel represented Amplex only in southern California. **Laurence Arky** has been named district manager of the northern area, which will be handled out of San Francisco. At the same time, Noel announced that **C. A. Jack Bedell** had joined the firm in Los Angeles as field engineer for the southern California area. He was formerly a lighting specialist with WESCO.

► **G-E** has opened an expanded **electronic tube and components** sales office at 442 Peninsular Ave., San Mateo, Calif.

► **Collyer** Electric Wire Sales Co. has been appointed exclusive agent in the Los Angeles area for **Universal** Wire & Cable Co. of Chicago, Collyer was organized on Aug. 1, 1958, to take over the sales and distribution of Collyer Insulated Wire Co. of Pawtucket, R. I.



Distributor salesmen work out problems, above, see products demonstrated, right

I-T-E Holds Forums

Working on the theory that product knowledge, together with familiarity with the catalog, will help distributors build sales, I-T-E Circuit Breaker Co. conducted two forums in the West in early November.

Conducted by product division managers from Philadelphia, the forums took distributor salesmen from general information about products and their respective places in the electrical industry right through actual problem solving situations, given to "teams" of the student salesmen.

Each problem-solving session was followed by a critique, resulting in an exchange of ideas between the distributor salesmen and I-T-E "faculty" members.

A highlight of both sessions was a visit to a 40-ft truck-trailer, where distributor salesmen could see products demonstrated.

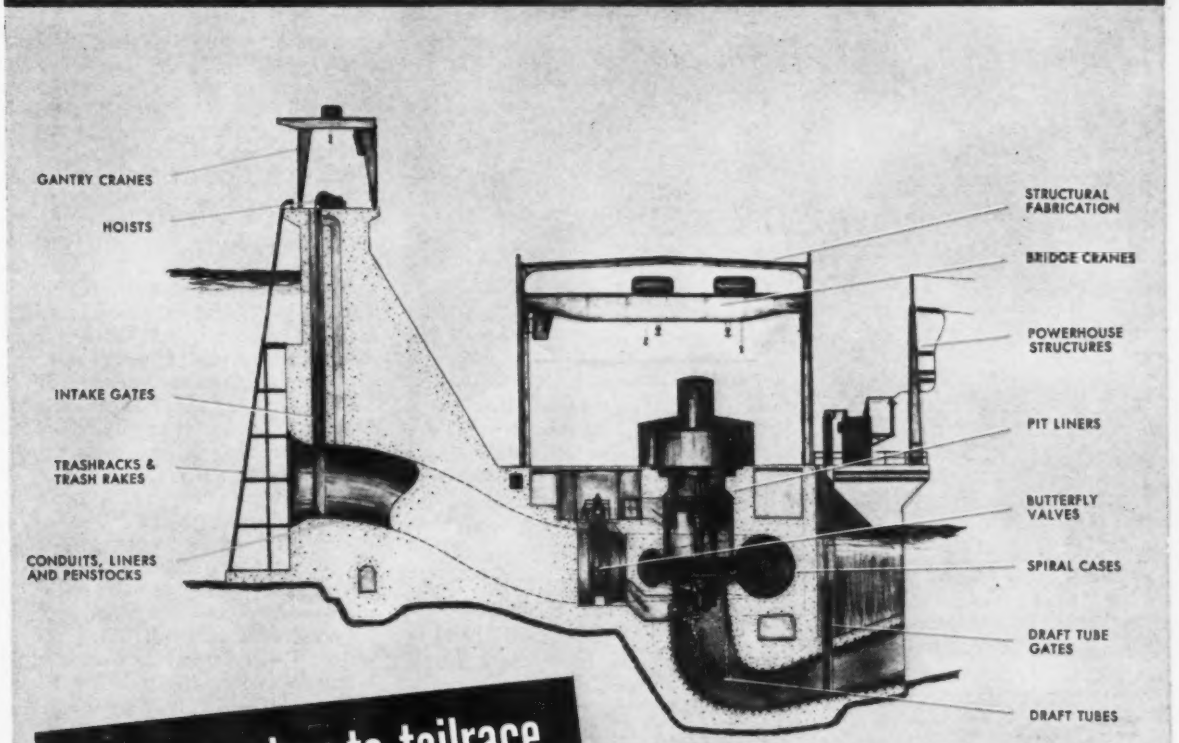
The first of the forums was at San Francisco and the second at Los Angeles. Conducting the various class sessions were Hugh Maxwell, Bill Harman, Herman Cabassa and Bill Dunbar, all from Philadelphia.

► **Hawkins & Sweeney** Co. is now exclusive distributor for Philco in Arizona, New Mexico and west Texas. John Hawkins, president of the firm, was with Philco for more than 20 years, most recently as general manager. He moves to his Phoenix headquarters from Philadelphia. Frank Sweeney Jr., vice-president, with Philco for 18 years, has been in Los Angeles as operation manager of financial and internal matters.

► Celebrating its 21st year of operation, **Western Insulated Wire** Co. has added plant, equipment and technical staff. An addition to the main plant in Los Angeles has been built and equipped to manufacture Teflon insulated hookup wires. Floor space of the Los Angeles warehouse has been doubled and synchro curing equipment to vulcanize four-conductor Bronco type W cable to AWG size 4/0 has been installed. Among additions to the technical staff is Hugo Biskeborn, who is working on advanced cable design. He has been associated in manufacture of electrical cables and allied equipment here and abroad and has authored many technical papers.

► **Peninsula Associates,** Pacific Coast manufacturers' representative, has moved into larger quarters with service facilities at 1345 Hancock St., Redwood City, Calif., and has opened a new Seattle branch at 3512 Western Ave.

HYDRO EQUIPMENT



from forebay to tailrace —from design to erection

BY YUBA

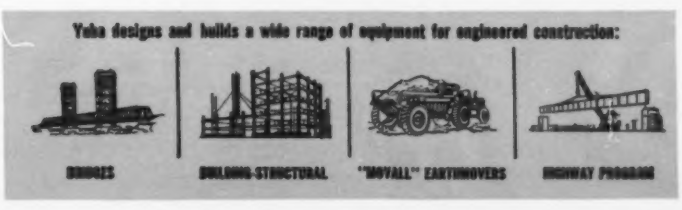
Your investigation will *prove* how Yuba's ability to design, fabricate, machine and erect anywhere in the world is backed by decades of experience, know-how of skilled personnel, and complete production facilities.

From forebay to tailrace—from design to erection, Yuba handles the complete job as a package responsibility. This relieves both user and contractor of the need for coordinating production, delivery and installation. Ask for Bulletin No. HY-51, describing Yuba's hydroelectric equipment and services, or ask for sales engineer to call.

IN THE EAST
Plants—*Adsco Division, 20 Milburn St., Buffalo 12, N.Y.; Yuba Heat Transfer Division, Honesdale, Pa.;* Sales Office—*530 Fifth Ave., New York.*

IN THE WEST
Plants—*Yuba Manufacturing Division, Benicia, Calif.; Judson Pacific-Murphy Corp., Emeryville, Calif.;* Sales Office—*520 Balfour Bldg., San Francisco.*

YUBA CONSOLIDATED INDUSTRIES, INC.



YUBA

Plants and Sales Offices
NATIONWIDE

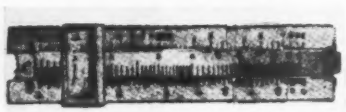
The Switch is to Sun Switch for dependable Street Lighting Controls!

WRITE TODAY FOR COMPLETE DATA

SunSwitch
DIVISION
RIPLEY COMPANY, INC., MIDDLETOWN, CONN.

Christmas!

Only Accurate, Useable
"SLIP-STICK" TIE BAR



actual size

Tie Bar is a 2 inch slide rule which actually works. Fully calibrated with scales A, C & D. Functional, accurate, distinctive and decorative. A great conversation piece. Each slide rule tie bar attractively gift boxed. Complete price, shipping included $3.95. Immediate delivery.

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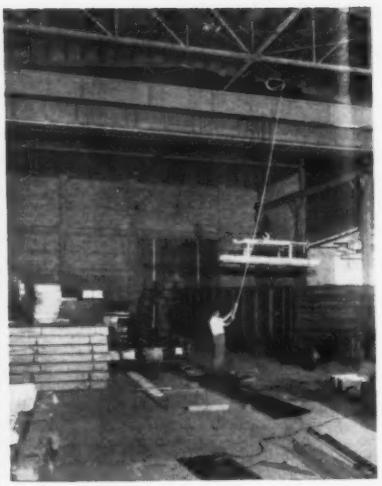
P. O. Box 2535 Los Angeles 28, Calif.

Name .....
Address .....
City ..... State .....
M.O. or Check Encl. for .....
☐ 14 K gold plate ☐ silver plate



First gondola is shunted into Alwalt Mfg. Co.'s new warehouse at Modesto, Calif., where a 7½-ton crane handles heavy equipment. To be used for manufacturing as well as storage, the 50x180-ft building was completed in six months despite the handicap of spring floods. Alwalt makes electrical products sold under the Circle A-W name. R. A. Johnson heads both firms

Steel Men Meet

Unless productivity keeps ahead of wages—it isn't doing so now—costs will force prices up. This was about what Benjamin F. Fairless, president of American Iron & Steel Institute, told the press at a conference Nov. 7, held prior to the institute's San Francisco regional technical meeting. Because steel wages usually spearhead other wage demands, he was asked this pertinent question. With negotiations about to begin in that industry he would make no predictions, only state basic principles. He also questioned the sense of demanding higher wages based only on what others get, rather than the productivity to support the increased cost.

In his address to the conference meeting, he warned that the United States is drifting into mediocrity because punitive personal income taxes and the destructive envy of those who do not excel in any endeavor combine to deprive good workers of their just rewards.

James B. Black, Pacific Gas and Electric Co. board chairman, in addressing the meeting described the power and fuel resources being developed to supply the Western steel industry. He, too, cautioned that employment costs in wages and benefits have grown at a rate of 6% a year, twice as fast as increased productivity.

Another significant statement: "In less than two centuries America has skimmed the cream of the known natural resources. However, much technology enables us to use poorer quality resources remaining, the cost will be higher. Capital investment in plant now averages about $9,000 per manufacturing employee. . . In my company, $136,000 are invested per employee. Without it there would be no job."

Program Boosts Sales

A "better selling" program that takes care of details and leaves the salesman free to do a top creative job is getting results for the Edwards Co. and its distributors, according to District Manager Paul Gallagher of San Francisco.

The company makes no direct sales and insists that its distributors take its entire line of signaling equipment.

Simplifying and organizing sales effort, the program can be fitted to individual needs of distributors. The package includes product and market education, technical assistance, cooperative selling, a sales meeting plan and a stock control setup. Among merchandising aids are a series of direct mail cards with follow up on the various items in the line.

► **Guy de Leuze,** 221 Oak St., San Francisco, is now representing two new accounts in northern California and Nevada. The firm will handle Universal ballasts, maintaining a stock in San Francisco for distributors. It will also represent Halo Lighting Co. of Chicago, which maintains stocks in Los Angeles.

APPARATUS SALES ENGINEER

Large electrical manufacturer of switchgear, unit substations, transmission and distribution switching and protective equipment needs services of Apparatus Engineer for the West Coast location. Duties will consist of contacting electric utilities on the West Coast with our established field organization, specifically to do product line sales promotion work on high-level engineering basis. Man chosen will be graduate Electrical Engineer, 30-45 years of age, with successful engineering, operation or sales experience with class of equipment listed. Travel required 60-70% of the time. Home week-ends. Substantial opportunity. Refresher training provided initially and periodically. Address replies to:

BOX NO. 299, ELECTRICAL WEST, 68 POST ST., SAN FRANCISCO 4, CALIF.

Giving complete resume of experience and financial history.

► **Control Equipment** Co., 323 W. 14th South, Salt Lake City, is representing **Automatic Switch** Co. in Utah and sections of four states.

► W. E. Helle of the **Square D** marketing division in Milwuakee was on the West Coast in November to introduce a new line, **spin top enclosures for combination starters.** Touring in a specially equipped station wagon, Helle called on customers that use explosionproof starters in hazardous locations.

► **Merco Products** Inc. of Eugene, Ore., has appointed **Thomas A. Fletcher,** 2216 Fifth St., Berkeley, Calif., as industrial sales agent in northern California and Nevada. Fletcher will supply the company's infrared equipment to wholesalers and manufacturers for incorporation in their own designs. Until recently the Merco infrared tube had been sold only as a complete unit.

► **Universal Western Electric** Corp. of Colorado Springs, Colo., has announced its sale to **Emerson Western Co.,** a subsidiary of Emerson Electric Mfg. Co. of St. Louis. J. Stanley Hoddy, who has been Universal vice-president, becomes president of Emerson Western and will remain in charge of the Colorado Springs plant. Fractional horsepower electric motors are manufactured at the plant which, according to Hoddy, has facilities to produce $6,000,000 worth annually.

Sales representatives of Lighting Dynamics see the new fixture line at the company's recent sales meeting in its Whittier, Calif., home office. The company has been completely reorganized since it was purchased by Ekco Products Co. from Ruby in 1956 and has increased its fluorescent line. West Coast sales representatives attending the meeting heard Jack Culberg, Ekco vice-president in charge of sales; Don Burns, Whittier division manager, Jim Bond, director of sales; and Knox Bourne, McGraw-Hill Publishing Co.

People

Adams

Bullock

Crouse-Hinds Changes

Several appointments on the West Coast have been announced by Crouse-Hinds Co.

W. C. Schafer of Seattle has been promoted to regional manager of the San Francisco region, with headquarters in San Francisco.

Schafer

W. G. Bullock, product engineer, transfers from Los Angeles to Seattle to replace Schafer.

John M. Adams has been transferred from New York to Los Angeles as product engineer.

Schafer began his career with the company in San Francisco 23 years ago. He has been in Seattle since 1947, is a member of the Illuminating Engineering Society. Bullock began his career in the Los Angeles office in 1943. Adams is an electrical engineering graduate of Rutgers University, and has been with the company for five years.

► **F. E. Lucking** has been appointed commercial manager of California Electric Power Co. Lucking, associated with Calectric for more than 34 years, has been manager of the company's Perris-Elsinore district for the past 14 years. In his new position he will supervise all of the company's commercial operations, including sales promotion, new business and other fields of customer relations. He will be located in Calectric's general offices in San Bernardino, and will report to **D. B. Wheelock,** commercial vice-president. **James G. Hart** has been appointed assistant commercial manager for the company. He will serve in that capacity along with **Wilks Lambirth,** present assistant commercial manager.

► **Robert R. Knerl** has joined the staff of Robert A. Young & Co. of Glendale in the capacity of sales engineer. Knerl's functions will include business development and customer relations responsibilities in the industrial and utilities field. His experience includes eight years with Anaconda Wire & Cable Co., and a period with Automation Products, both in southern California. He is a member of AIEE, Los Angeles Junior Chamber of Commerce and the Los Angeles Electric Club.

Knerl

► **D. J. Kerby** has been appointed Pacific Coast regional merchandise manager of American-Standard, American Blower Division. He will headquarter in Los Angeles and be responsible for providing sales and application engineering assistance to jobbers in connection with the company's line of packaged merchandise products, commercial air conditioning equipment and special products.

NEW... REPUBLIC ELECTRUNITE E.M.T.

SILVERSLICK

makes wire pulling up to 37% EASIER

Best before . . . even better now! New Republic ELECTRUNITE® E.M.T. with exclusive SILVERSLICK inside finish makes wire pulling up to 37% easier. Wire pushing is easier, too.

SILVERSLICK—the silver-colored, slippery inside finish combines with ELECTRUNITE's exclusive "INSIDE-KNURLING" to offer you greater installation advantages and economies. Here's how it works:

Wires ride *over* the knurling, thus cutting friction, and SILVERSLICK acts as a lubricant making wires slip smoothly, easily through the tube.

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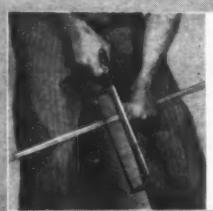


EXCLUSIVE "INCH-MARKS®" make quick measurements a cinch. Every length of Republic ELECTRUNITE E.M.T. is marked off from end to end in feet and inches.

"GUIDE-LINE" extends full length of tubing. By properly aligning with calibrations on Republic Bender, bends are kept in correct plane.

UNIFORM DUCTILITY in every foot of Republic ELECTRUNITE E.M.T. assures smooth, accurate bends *every time*—with no costly kinks.

► **James A. Reimholz** has joined the sales staff of the Los Angeles district of I-T-E Circuit Breaker Co. He will sell the company's complete line of electrical protection, transmission and distribution equipment in that area. Reimholz was a sales engineer for six years with Clark Controller Co. in both the Cleveland and Los Angeles sales offices. He is a graduate of Case Institute of Technology. Reimholz is a member of AIEE, Electrical Maintenance Engineers Assn. and the Association of Iron and Steel Engineers.

Reimholz

► **Robert W. Gardner,** famous in California as an amateur golfer, has joined Triangle Conduit & Cable Co. as supervisor of distributor relations. He will headquarter at New Brunswick, N. J.

► **F. A. Lazenby** has been promoted to assistant chief engineer (executive), and **G. F. Green** assistant chief engineer (technical services), for British Columbia Electric Co. Green has been with B. C. Electric since 1937, and Lazenby since 1925.

► **Scott Beamer,** consulting electrical engineer, has moved his offices to expanded quarters at 478 Santa Clara Ave., Oakland, Calif. Since his new offices will be adjacent to those of Sanford W. Fox, mechanical engineer, their combined services will now be available, if and as desired.

Spencer

Olson

► **Rhodes V. Spencer** has been appointed power operations engineer for Seattle City Light. He succeeds **William J. Olson,** who retired Nov. 1. Spencer has been with Seattle City Light since June 1917. Spencer is an electrical engineering graduate of the University of Washington.

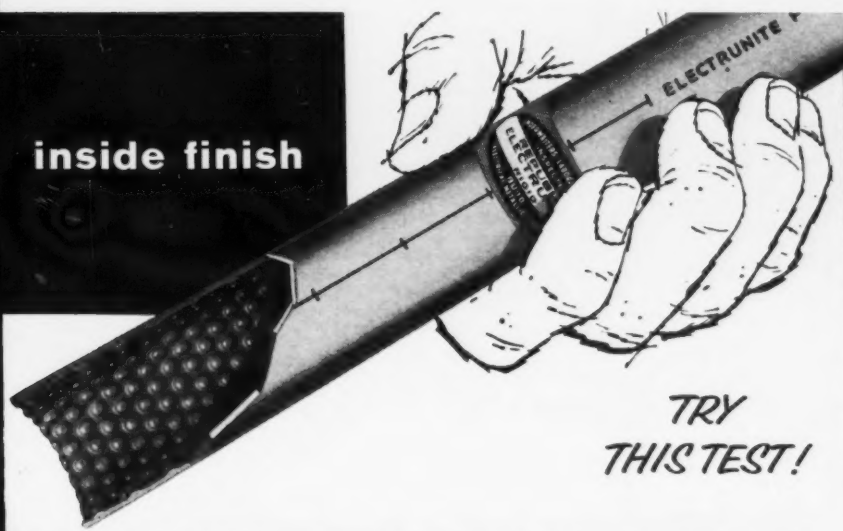
► **Jim Raney** and his R & M Sales Co. in Denver will represent Grip-Tite Manufacturing Co., manufacturer of earth anchors. Raney's background includes 17 years with Public Service Co. of Colorado and two years as a salesman for Sales Engineers Co., before forming his own agency. He will represent Grip-Tite in both Colorado and Wyoming.

Raney

► **Lloyd Elmer** has been appointed branch manager of the appliance and television department of General Electric Supply Co. in Spokane. G-E Supply announces also the transfer of **Edward Rosa** from Spokane to Tacoma.

► **J. E. Moore** has been promoted to district manager of the southern California district of General Cable Corp. He will headquarter in Los Angeles. Assistant district manager of the same area will be **F. H. Schonhoff.** He moves to the new position from the company's Emeryville plant.

inside finish



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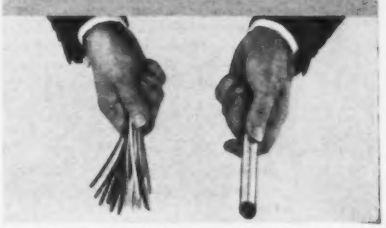

Take a sample length of Republic ELECTRUNITE E.M.T. with new SILVERSLICK inside finish. Insert a bundle of 25 pipe cleaners. Now, push-pull the pipe cleaners through the tubing.

As many as three No. 12's can be pushed-pulled through ½" Republic ELECTRUNITE E.M.T. easily. Ask your electrical distributor sales representative to show you this demonstration.

more Installation Features...

GALVANIZING protects every inch of Republic ELECTRUNITE E.M.T. The special finish will not chip or flake when the tube is bent.

UNIFORM CONCENTRICITY provides a truly round tube for snug-fitting connections. No threads to cut, no muss, no fuss!

Reid

Dunn

► **Earl A. Reid** has been appointed general manager of the new Portland branch plant of RT&E Corp. Sales manager for the new branch is **Howard A. Dunn.** Both will hea l-quarter at the Portland plant.

► **Ray Pohl** has joined the George R. Magnes Co. Inc. sales organization in San Francisco, and will be in charge of the peninsula, valley and Oakland territory. During the past 4½ years he has been with Westinghouse Electric Supply Co. in the Sacramento and San Francisco Bay areas.

► **Robert D. Oswald,** formerly with Graybar Electric Co. Inc., has joined the sales staff of General Cable Co. at Denver. He succeeds Frank A. Keppelmann, who in turn took a position with Graybar.

► **Martin J. Sherry** has been appointed an account executive in the industrial controls division of General Controls Co. His new duties will be assumed at the Glendale, Calif., headquarters of the firm.

► **Harvey A. Habel** has been appointed a sales representative for Arrow-Hart & Hegeman Electric Co. in the Portland area. He succeeds **H. L. Williams,** who continues to reside in Seattle, representing the company in the area comprised by the State of Washington and western Montana.

► **Clarence A. Wetherill** has been promoted to chief engineer of Stromberg-Carlson, San Diego. He has been assistant chief engineer since joining the company in August 1957.

Deaths

► **John S. Dickinson,** who retired in August after serving as manager of Wahkiakum County PUD since 1940, died Oct. 13. He was manager of the West Coast Power Co. at Cathlamet from 1937 until the company's properties were acquired by the PUD. He served as president of the Northwest Public Power Assn. in 1946.

► **Donald D. Stewart,** 70, founder of the Organization Service Bureau, died Nov. 3 in Seattle. He served as executive secretary of the Northwest Appliance & Television Dealers' Assn. and many other trade organizations.

► **Wilford O. Cluff,** sales manager for the former Telluride Power Co., died recently. A coronary occlusion was the cause of death.

► **Charles F. Monson** Jr., 46, superintendent of systems operations for Puget Sound Power & Light Co., died Oct. 28. He joined the company in 1939 as a student engineer. He received his degree in electrical engineering from Washington State College in 1938.

► **Robert F. Throne,** 63, former chief mechanical engineer for Public Service Co. of Colorado, died at a Denver hospital Nov. 8. He retired Sept. 1 because of illness. He served 41 years with the company, and supervised the design and construction of several major steam generating plants.

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REPUBLIC RIGID CONDUIT
GALVITE® (Blue Label) is hot dipped galvanized inside and out; has special coat of baked-on lacquer inside and out for further corrosion resistance. ENAMELITE® (Red Label) is protected inside and out with heavy baked-on coating of tough, wear-resistant enamel for resistance to corrosive action.

REPUBLIC "DEKORON-COATED" E.M.T.
Use Republic ELECTRUNITE "Dekoron®-Coated" E.M.T. wherever corrosive conditions affect standard conduit. Tough coating of polyethylene is applied over galvanized tubing to form an end-to-end armor. Easy to cut, bend. Republic "Dekoron-Coated" Rigid Steel Conduit available in heavier wall sizes.

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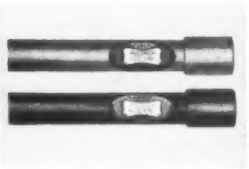
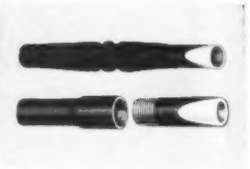
The Republic Bending System is a fast, mathematically accurate method of making predetermined bends by using the "INCH-MARKS®" and "GUIDE-LINED" features of Republic ELECTRUNITE E.M.T. with the Republic Bending Tool. Fast, easy, accurate. Send for free booklet, S-D, "The Bending System".





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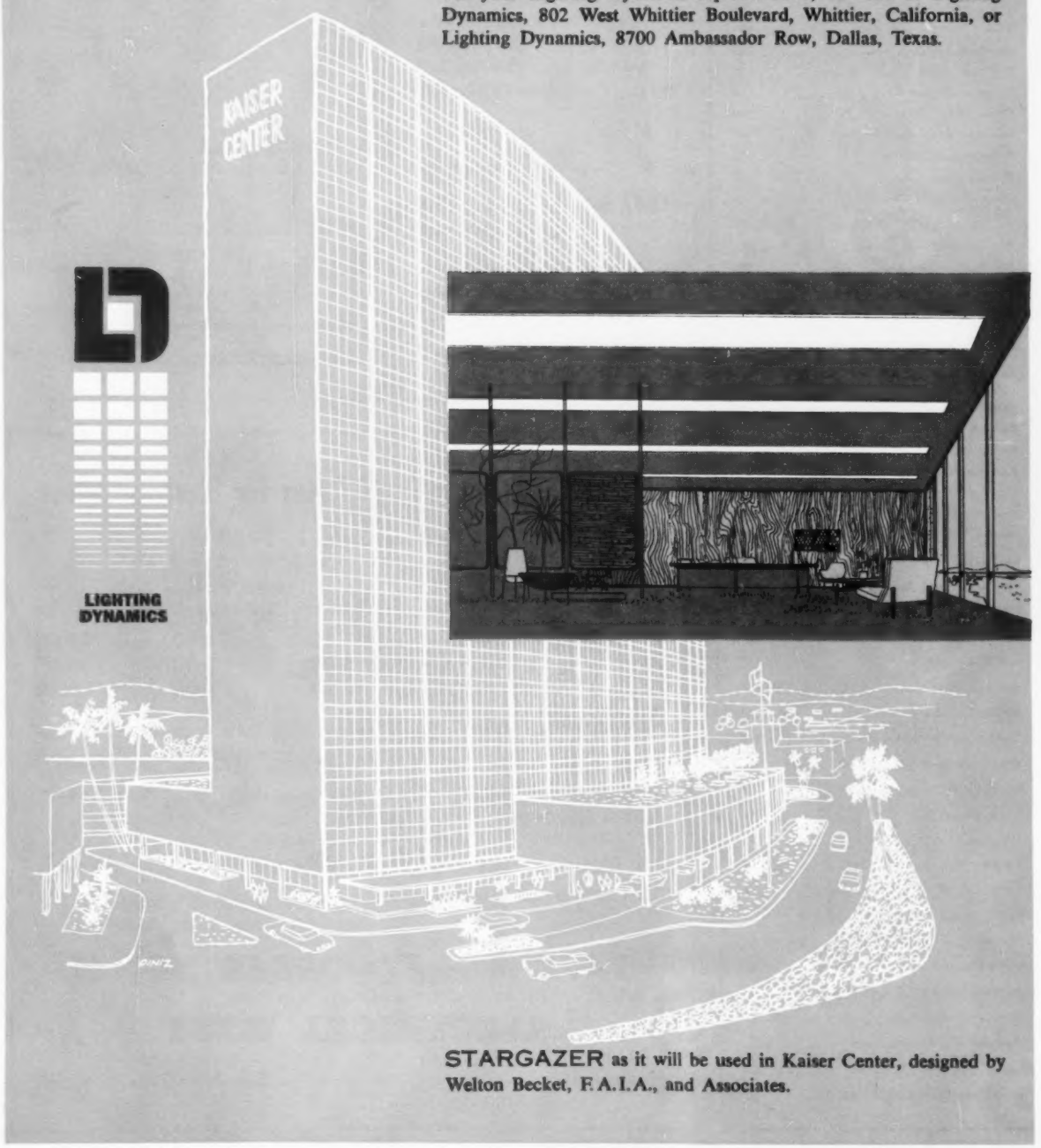
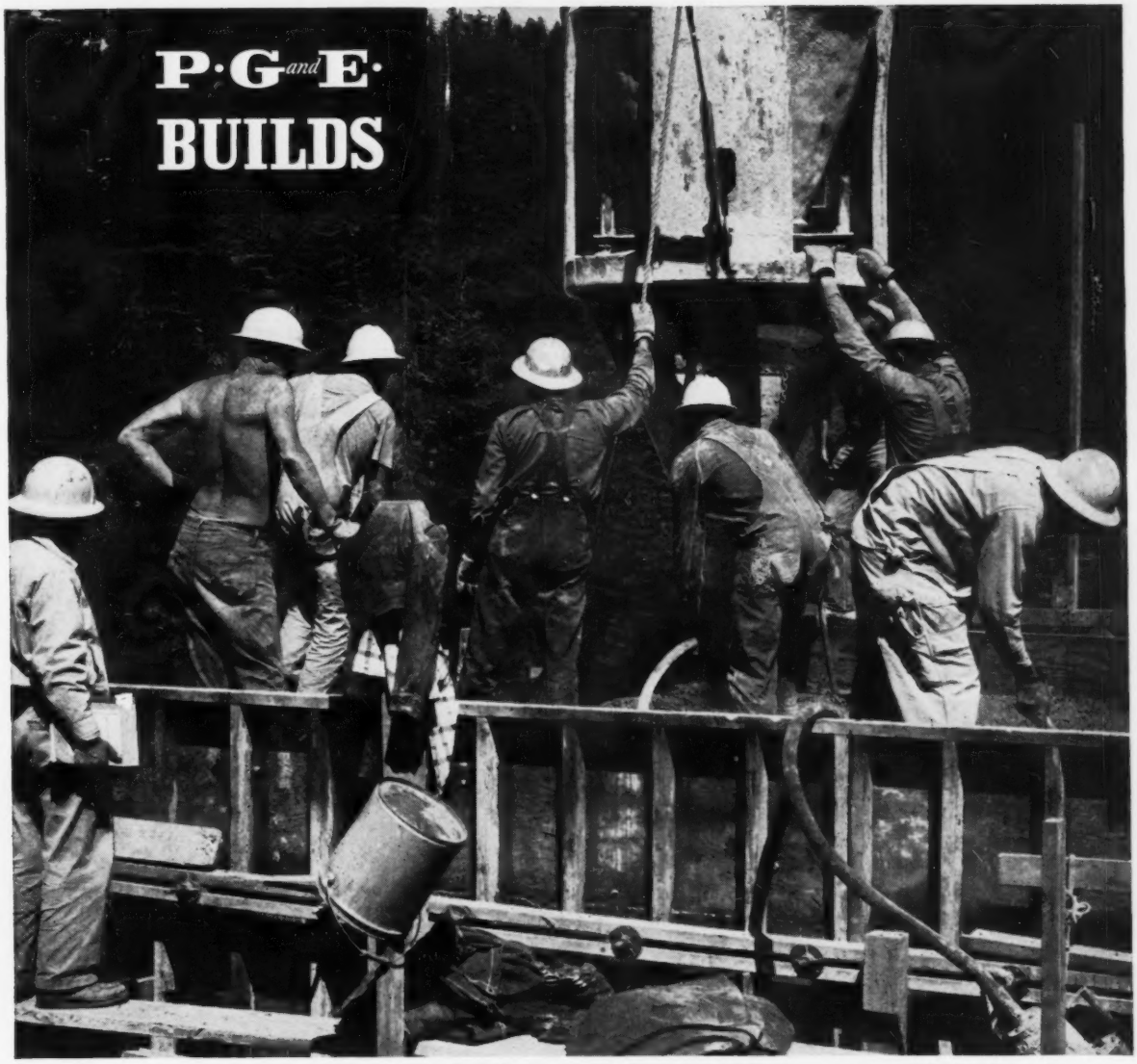
STARGAZER with a distinctive half-inch aluminum louver was developed at Lighting Dynamics especially for Kaiser Center. Stargazer matches the fine detailing and integrates perfectly with the radiant acoustical ceiling. Now Stargazer is available for other advanced applications. It's easily installed—just pushes-up-and-clips. It has a shallow design; and is surprisingly inexpensive . . . comes in a variety of widths and lengths. Durable, Bonderized, and electrostatic, high reflectance finishes. FOR MORE COMPLETE INFORMATION, call your Lighting Dynamics representative, or write to Lighting Dynamics, 802 West Whittier Boulevard, Whittier, California, or Lighting Dynamics, 8700 Ambassador Row, Dallas, Texas.



STARGAZER as it will be used in Kaiser Center, designed by Welton Becket, F.A.I.A., and Associates.



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* Burd (bird), n. a lady or young woman. Webster's New Collegiate Dictionary, 1956 edition, p. 111.